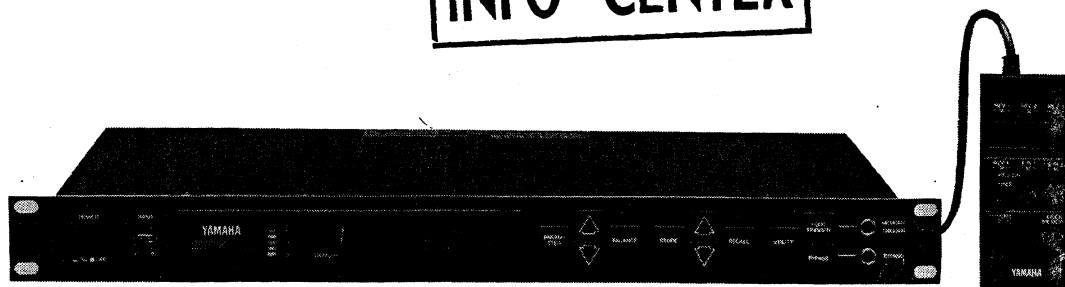


# DIGITAL SOUND PROCESSOR SPX90

## SERVICE MANUAL

INFO - CENTER



### ■ CONTENTS

SPECIFICATIONS .....	1
BLOCK DIAGRAM .....	1
PANEL LAYOUT .....	2
ROOM SIZE CHART .....	3
SIGNAL FLOW .....	4
PRESET PROGRAM LIST .....	5
CIRCUIT BOARD LAYOUT .....	7
CHECKS AND ADJUSTMENTS .....	8
TEST PROGRAM .....	9
MIDI DATA FORMAT .....	11
LSI DATA TABLE .....	13
CIRCUIT BOARDS .....	15
PARTS LIST	

006694

SINCE 1887



**YAMAHA**

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

## IMPORTANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherent to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

**WARNING:** Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

**IMPORTANT:** The presentation or sale of this manual to any individual or firm does not constitute authorization, certification, recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and changes in specification are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

**WARNING:** Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

**IMPORTANT:** Turn the unit OFF during disassembly and parts replacement. Recheck all work before you apply power to the unit.

# SPECIFICATIONS

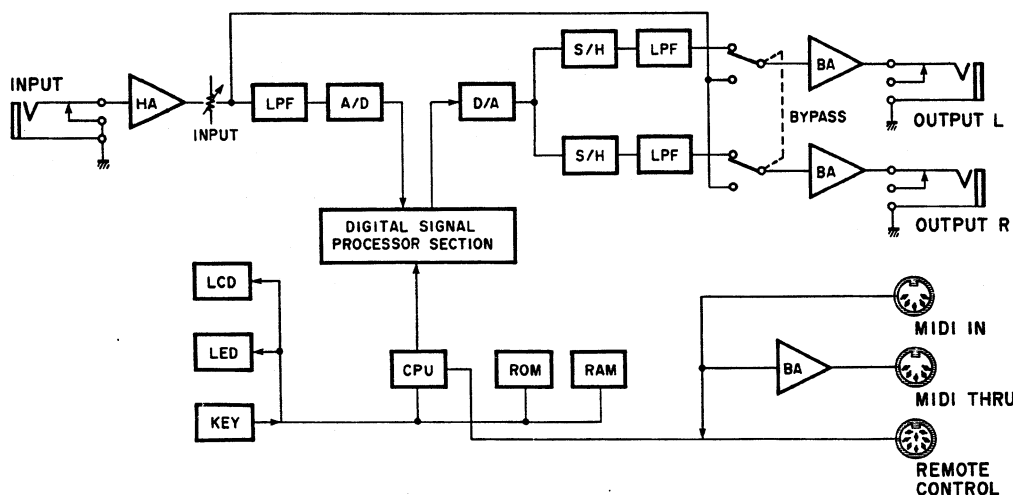
<b>INPUT</b>	
Number of Channels	Unbalanced × 1 (Phone Jack)
Nominal Level	- 20 dBm/+ 4 dBm, Selectable
Impedance	10 k-ohms
Level Control	Volume, Max. Gain + 12 dB
Level Monitor	7 LED Indicators
<b>A/D CONVERSION</b>	
Sampling Freq.	31.25 kHz
Quantization	Linear 16 Bit
Band Width	20 Hz to 12 kHz
Number of Channels	1
<b>D/A CONVERSION</b>	
Number of Channels	2
Sampling Freq.	31.25 kHz
Quantization	Linear 16 Bit
Band Width	20 Hz to 12 kHz
<b>OUTPUT</b>	
Number of Channels	Unbalanced × 2 (Phone Jack)
Nominal Level	- 20 dBm/+ 4 dBm, Selectable
Impedance	600 ohms
Mixing	Direct Signal, Effect Signal
Bypass	ON/OFF
<b>MEMORY</b>	
Presets (ROM)	1 - 30
User Memory (RAM)	31 - 90 (Non Volatile)
All parameters except Input Level, can be memorized	
Key On triggers the programs 18, 19, 20, 28 and 29	
<b>MIDI CONTROL</b>	
MIDI Channel (1 to 16, OMNI), (4 banks), Program Number (1 to 128)	
Note on/off is recognized only for pitch change A, D and freeze B	
<b>FRONT PANEL</b>	
Display	16 character 2 lines LCD × 1, 2 digits numeric LED for Memory display, 7 LED indicators for level monitoring
Knob	Input Level Volume
Keys	Parameter/Balance/Data Increment/Data Decrement, Memory Store/ Recall/Data Increment/Data Decrement, Utility/Foot Trigger/Bypass

<b>ELECTRICAL CHARACTERISTICS</b>	
<b>Dynamic Range</b>	Reverb: more than 75 dB
	Delay : more than 81 dB
<b>Distortion</b>	Bypassed Signal: less than 0.01%
	Effect Signal : less than 0.03%
	Effect Signal : less than 0.03%
<b>Band Width</b>	Bypassed Signal: 20 Hz to 20 kHz
	Effect Signal : 20 Hz to 12 kHz
<b>POWER SUPPLY</b>	
U. S. & Canadian Models	110V - 120V, 60Hz
General Model	220V - 240V, 50/60Hz
<b>POWER CONSUMPTION</b>	
U. S. & Canadian Models	20W
General Model	20W
<b>DIMENSIONS (W × H × D)</b>	
480mm × 45.2mm × 285mm (18-7/8" × 1-3/4" × 11-1/4")	
<b>WEIGHT</b>	3.2 kg (7 lbs)
<b>OPTIONAL REMOTE CONTROL</b>	
PRESET PROGRAM 1 - 30, USER MEMORY 31 - 37	

\* NOTE: Since natural sounding reverberation is mixed with the direct sound, and hence does not constitute 100% of the sound, the effective dynamic range will nearly always exceed 90 dB.

\*\* 0 dBu is 0.775 volts RMS. This value represents voltage across a high impedance input. dBu is the equivalent of dBu if specified across a 600 ohm load.

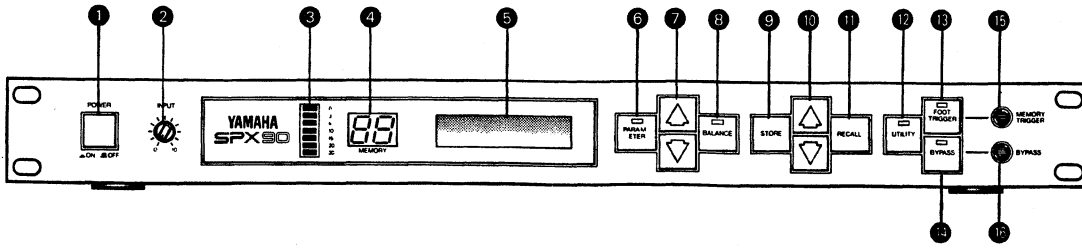
# BLOCK DIAGRAM



SPX90

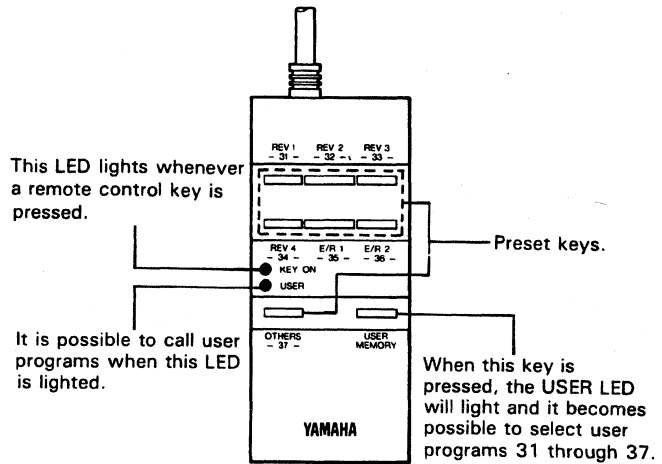
## ■ PANEL LAYOUT

### ● Front Panel

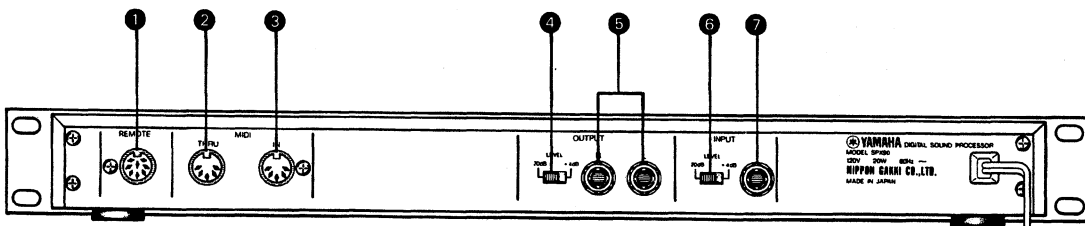


- ① Power ON/OFF Switch
- ② Input Level Control (0 ~ 10)
- ③ Input Level Meter
- ④ Memory Number LED
- ⑤ LCD Program and Parameter Indicator
- ⑥ Parameter Key
- ⑦ Parameter Increment/Decrement Keys
- ⑧ Balance/Output Level Key
- ⑨ Store Key
- ⑩ Memory Increment/Decrement Keys
- ⑪ Recall Key
- ⑫ Utility Key
- ⑬ Foot Trigger Key
- ⑭ Bypass Key
- ⑮ Memory/Trigger Footswitch Jack
- ⑯ Bypass Footswitch Jack

### ● Remote Controller



### ● Rear Panel

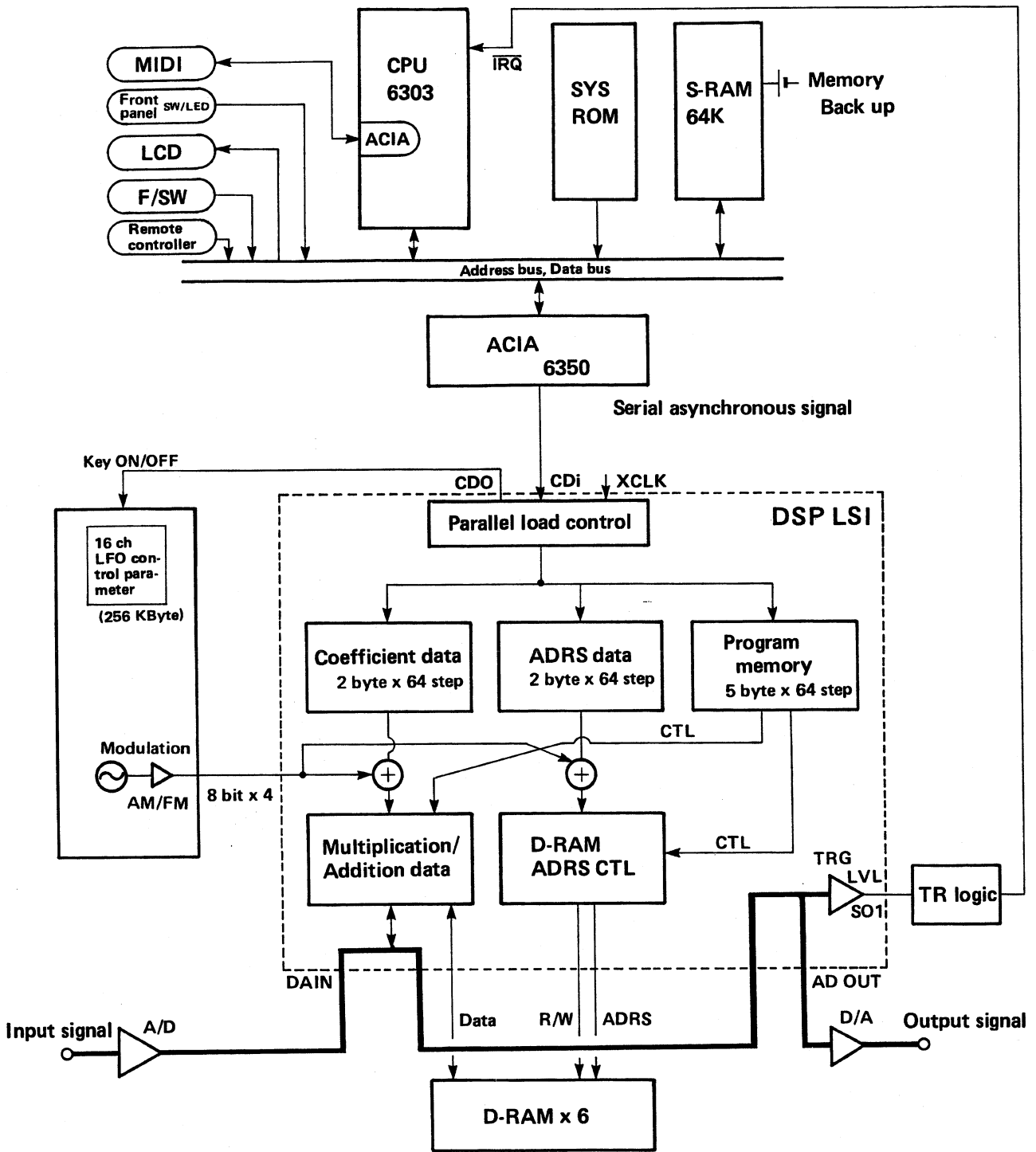


U.S. & Canadian models

- ① Remote Control Connector
- ② MIDI THRU terminal
- ③ MIDI IN Terminal
- ④ Output Level Selector (- 20 dB, + 4 dB)
- ⑤ Output Jacks (L and R)
- ⑥ Input Level Selector (- 20 dB, + 4 dB)
- ⑦ Input Jack

SPX90

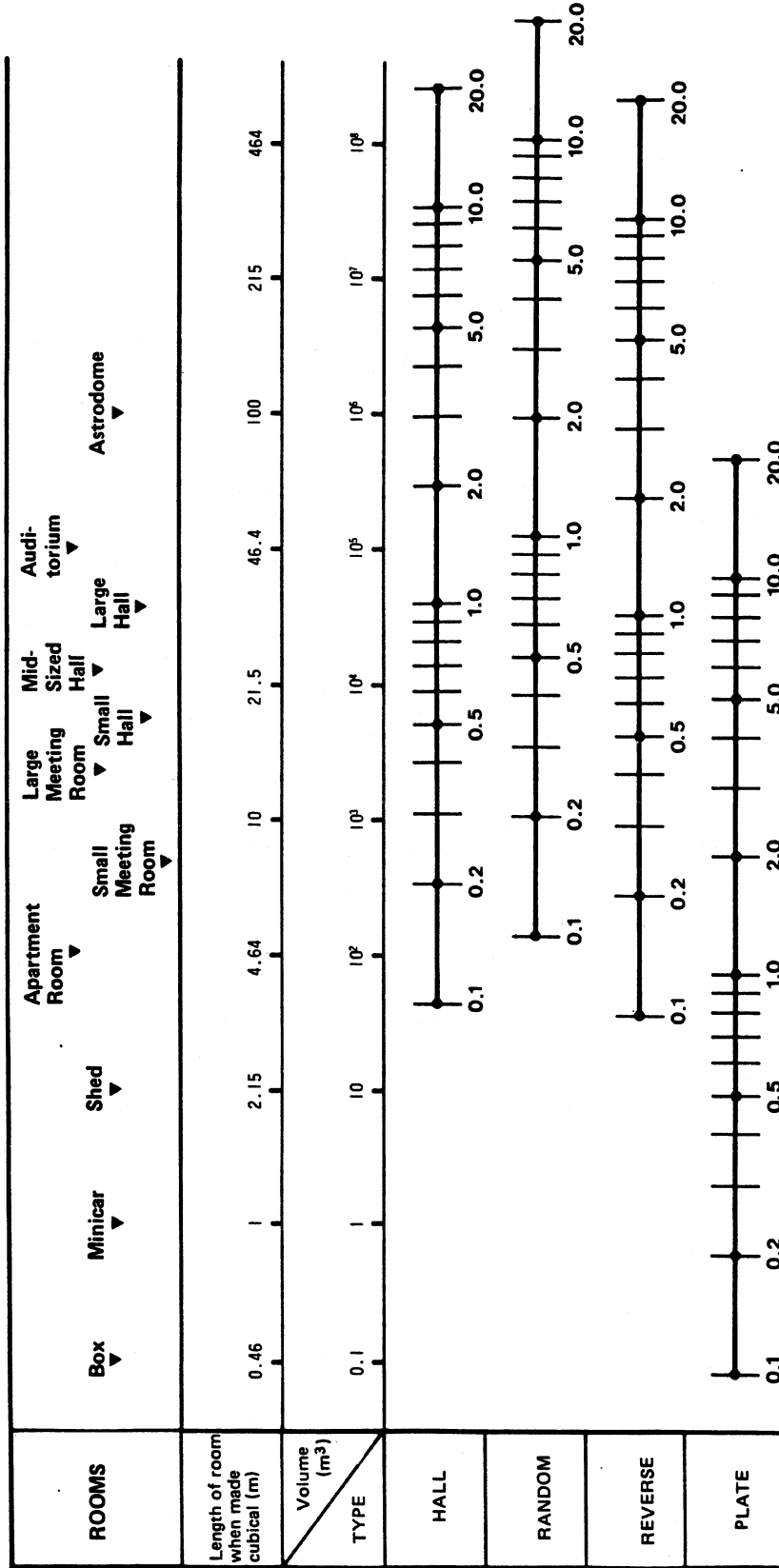
■ SIGNAL FLOW



SPX90

ROOM SIZE CHART

SPX90

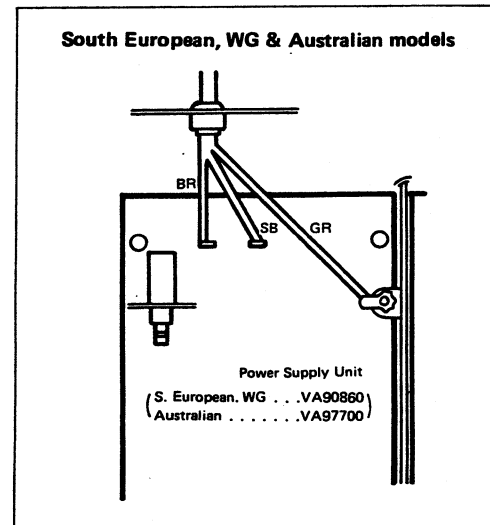
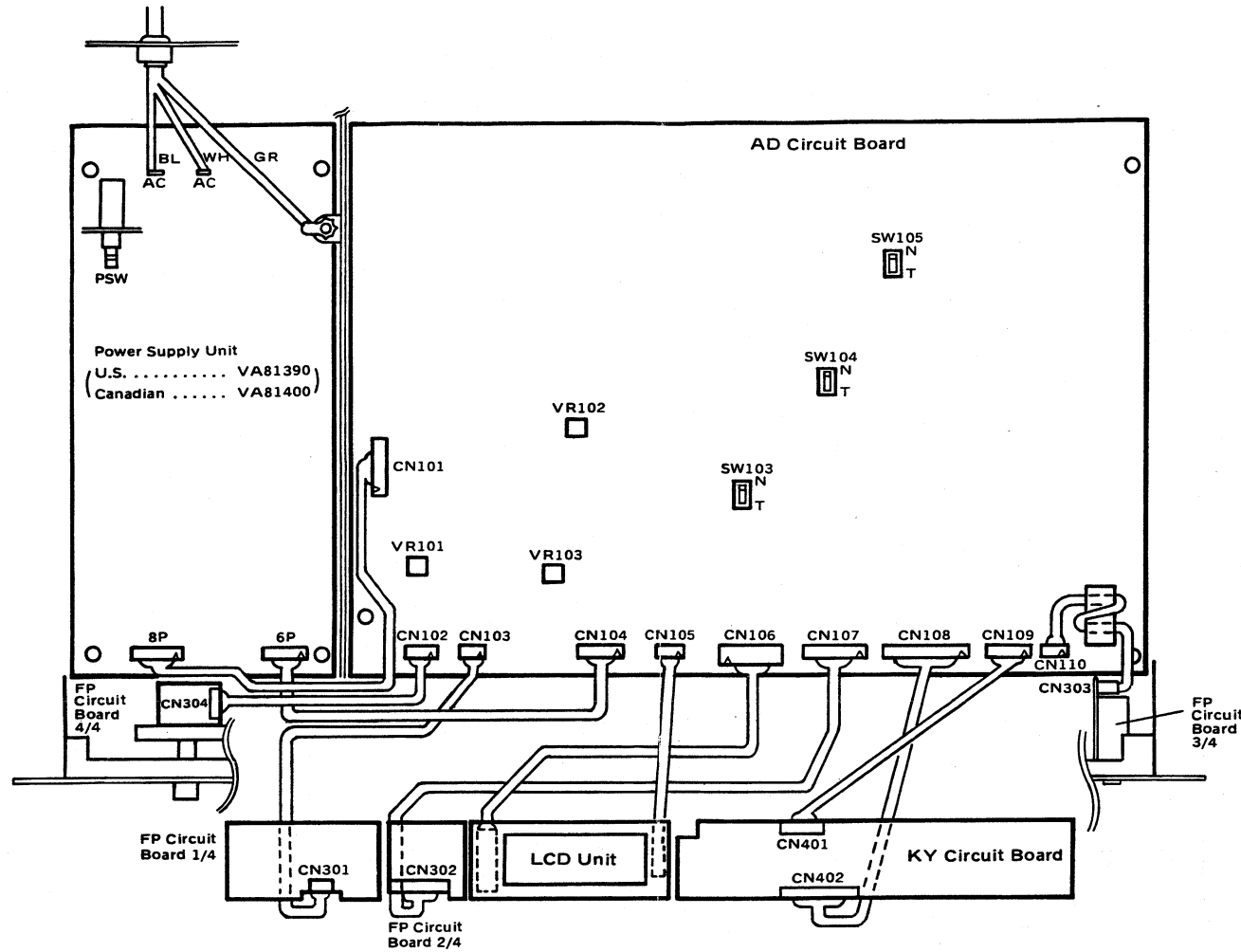


■ PRESET PROGRAM LIST

MEM. No.	PROGRAM NAME	TYPE	PARAMETERS									BALANCE	
			1	2	3	4	5	6	7	8	9	BALANCE	OUT LVL
1	REV 1 HALL	REV	REV TIME 2.6s (0.3-99.0s)	HIGH 0.6 (0.1-1.0)	DELAY 30.0ms (0.1-50.0ms)	HPF THRU (THRU, 32Hz-1.0kHz)	LPF 8.0kHz (1.0kHz-11kHz, THRU)					100% (0-100%)	100% (0-100%)
2	REV 2 ROOM	"	REV TIME 1.5s (0.3-99.0s)	HIGH 0.7 (0.1-1.0)	DELAY 20.0ms (0.1-50.0ms)	HPF THRU (THRU, 32Hz-1.0kHz)	LPF 8.0kHz (1.0kHz-11kHz, THRU)					100% (0-100%)	100% (0-100%)
3	REV 3 VOCAL	"	REV TIME 2.4s (0.3-99.0s)	HIGH 0.5 (0.1-1.0)	DELAY 45.0ms (0.1-50.0ms)	HPF 80Hz (THRU, 32Hz-1.0kHz)	LPF 8.0kHz (1.0kHz-11kHz, THRU)					100% (0-100%)	100% (0-100%)
4	REV 4 PLATE	"	REV TIME 1.8s (0.3-99.0s)	HIGH 0.7 (0.1-1.0)	DELAY 10.0ms (0.1-50.0ms)	HPF 40Hz (THRU, 32Hz-1.0kHz)	LPF 10.0kHz (1.0kHz-11kHz, THRU)					100% (0-100%)	100% (0-100%)
5	EARLY REF. 1	E/R 1	TYPE HALL (HALL/RANDOM REVERSE/PLATE)	ROOM SIZE 2.0 (0.1-20.0)	LIVENESS 5 (0-10)	DLY 10.0ms (0.1-400.0ms)	LPF THRU (1.0kHz-11kHz, THRU)					100% (0-100%)	100% (0-100%)
6	EARLY REF. 2	E/R 2	TYPE HALL (HALL/RANDOM REVERSE/PLATE)	ROOM SIZE 2.0 (0.1-20.0)	LIVENESS 5 (0-10)	DLY 10.0ms (0.1-400.0ms)	LPF THRU (1.0kHz-11kHz, THRU)					100% (0-100%)	100% (0-100%)
7	DELAY L, R	DELAY	Lch DLY 100.0ms (0.1-500.0ms)	Lch F.B 0% (-99-+99%)	Rch DLY 200.0ms (0.1-500.0ms)	Rch F.B 0% (-99-+99%)	HIGH 1.0 (0.1-1.0)					100% (0-100%)	100% (0-100%)
8	STEREO ECHO	ECHO	Lch DLY 170.0ms (0.1-250.0ms)	Lch F.B 60% (-99-+99%)	Rch DLY 178.0ms (0.1-250.0ms)	Rch F.B 58% (-99-+99%)	HIGH 0.9 (0.1-1.0)					100% (0-100%)	100% (0-100%)
9	STEREO FLANGE A	MOD.	MOD. FRQ 2.5Hz (0.1-20.0Hz)	MOD. DEPTH 50% (0-100%)	MOD. DLY 1.2ms (0.1-100.0ms)	F.B GAIN 35% (0-99%)						50% (0-100%)	100% (0-100%)
10	STEREO FLANGE B	"	MOD. FRQ 0.5Hz (0.1-20.0Hz)	MOD. DEPTH 90% (0-100%)	MOD. DLY 1.0ms (0.1-100.0ms)	F.B GAIN 40% (0-99%)						75% (0-100%)	100% (0-100%)
11	CHORUS A	"	MOD. FRQ 0.2Hz (0.1-20.0Hz)	DM DEPTH 50% (0-100%)	AM DEPTH 40% (0-100%)							100% (0-100%)	100% (0-100%)
12	CHORUS B	"	MOD. FRQ 0.6Hz (0.1-20.0Hz)	DM DEPTH 50% (0-100%)	AM DEPTH 10% (0-100%)							100% (0-100%)	100% (0-100%)
13	STEREO PHASING	"	MOD. FRQ 1.1Hz (0.1-20.0Hz)	MOD. DEPTH 100% (0-100%)	MOD. DLY 3.0ms (0.1-8.0ms)							100% (0-100%)	100% (0-100%)
14	TREMOLO	"	MOD. FRQ 6.0Hz (0.1-20.0Hz)	MOD. DEPTH 50% (0-100%)								100% (0-100%)	100% (0-100%)
15	SYMPHONIC	"	MOD. FRQ 0.7Hz (0.1-20.0Hz)	MOD. DEPTH 50% (0-100%)								100% (0-100%)	100% (0-100%)
16	GATE REVERB	E/R2	TYPE RANDOM (HALL/RANDOM REVERSE/PLATE)	ROOM SIZE 2.0 (0.1-20.0)	LIVENESS 5 (0-10)	DELAY 20.0ms (0.1-400.0ms)	LPF 6.3kHz (1.0kHz-11kHz, THRU)					100% (0-100%)	100% (0-100%)
17	REVERSE GATE	"	TYPE REVERSE (HALL/RANDOM REVERSE/PLATE)	ROOM SIZE 3.3 (0.1-20.0)	LIVENESS 5 (0-10)	DELAY 25.0ms (0.1-400.0ms)	LPF THRU (1.0kHz-11kHz, THRU)					100% (0-100%)	100% (0-100%)
18	ADR-NOISE GATE	GATE	TRG. LEVEL 65 (1-100)	TRG. DLY 7ms (-100-100ms)	TRG. MSK 5ms (5-3200ms)	ATTACK 5ms (5-3200ms)	DECAY 5ms (5-3200ms)	DECAY LVL 100% (0-100%)	HOLD 90ms (1-3000ms)	RELEASE 5ms (5-3200ms)	MIDI TRG. OFF (OFF/ON)	100% (0-100%)	100% (0-100%)
19	COMPRESSOR	"	TRG. LEVEL 89 (1-100)	TRG. DLY 25ms (-100-100ms)	TRG. MSK 42ms (5-3200ms)	ATTACK 22ms (5-3200ms)	HOLD 28ms (1-3000ms)	HOLD LEVEL 1% (0-100%)	RELEASE 525ms (5-3200ms)	MIDI TRG. OFF (OFF/ON)		100% (0-100%)	100% (0-100%)
20	REVERB & GATE	R & G	REV TIME 2.0s (0.3-99.0s)	HIGH 0.6 (0.1-1.0)	DELAY 10.0ms (0.1-50.0ms)	HPF THRU (THRU, 31Hz-1.0kHz)	LPF THRU (1.0kHz-11kHz, THRU)	TRG. LEVEL 65 (1-100)	HOLD 150ms (1-3000ms)	RELEASE 5ms (5-3200ms)	MIDI TRG. OFF (OFF/ON)	100% (0-100%)	100% (0-100%)
21	PITCH CHANGE A	PITCH	PITCH 0 (-12-12)	FINE 0 (-100-100)	DELAY 0.1ms (0.1-400.0ms)	F.B GAIN 0% (0-99%)	BASE KEY C3 (OFF, C1-C6)					100% (0-100%)	100% (0-100%)
22	PITCH CHANGE B	"	1 PITCH 0 (-12-12)	1 FINE 8 (-100-100)	1 DLY 0.1ms (0.1-400.0ms)	2 PITCH 0 (-12-12)	2 FINE 8 (-100-100)	2 DLY 20.0ms (0.1-400.0ms)				100% (0-100%)	100% (0-100%)
23	PITCH CHANGE C	"	L PITCH 0 (-12-12)	L FINE 10 (-100-100)	L DLY 0.1ms (0.1-200.0ms)	R PITCH 0 (-12-12)	R FINE 8 (-100-100)	R DLY 0.1ms (0.1-200.0ms)				100% (0-100%)	100% (0-100%)
24	PITCH CHANGE D	"	PITCH 0 (-12-12)	FINE 0 (-100-100)	DELAY 0.1ms (0.1-400.0ms)	F.B GAIN 0% (0-99%)	BASE KEY C3 (OFF, C1-C6)					100% (0-100%)	100% (0-100%)
25	FREEZE A	FREEZE	REC MODE AUTO (MANUAL/AUTO)	TRG. DLY -5ms (-500-500ms)	RECORD	OVER DUB	PLAY	START 0 (0-500)	END 500 (0-500)	INPUT TRG. OFF (OFF/ON)		100% (0-100%)	100% (0-100%)
26	FREEZE B	"	REC MODE MANUAL (MANUAL/AUTO)	TRG. DLY -50ms (-500-500ms)	RECORD	OVER DUB	PLAY	PITCH 0 (-12-12)	FINE 0 (-100-100)	BASE KEY C3 (OFF, C1-C6)		100% (0-100%)	100% (0-100%)
27	AUTO PAN	PAN	PAN SPEED 0.7Hz (0.1-20.0Hz)	DIRECTION L-R (L-R, L-R)	DEPTH 75% (0-100%)							100% (0-100%)	100% (0-100%)
28	TRIGGERED PAN	"	TRG. LEVEL 65 (1-100)	TRG. DLY -10ms (-100-100ms)	TRG. MSK 100ms (5-3200ms)	ATTACK 22ms (5-3200ms)	PANNING 525ms (5-3200ms)	RELEASE 840ms (5-3200ms)	DIRECTION L-R (L-R, L-R)	L/R BALANCE 30% (0-100%)	MIDI TRG. OFF (OFF/ON)	100% (0-100%)	100% (0-100%)
29	DELAY VIBRATO	VIB	TRG. LEVEL 100 (1-100)	VIB DLY 1400ms (0-3000ms)	VIB RISE 400ms (5-3200ms)	VIB FRQ 7.0Hz (0.1-20.0Hz)	VIB DEPTH 40% (0-100%)	MIDI TRG. ON (OFF/ON)				100% (0-100%)	100% (0-100%)
30	PARAMETRIC EQ.	PEQ	HPF THRU (THRU, 32Hz-1.0kHz)	MID FRQ 500Hz (315Hz-4.0kHz)	MID GAIN 0dB (-15-15dB)	MID Q 1.0 (0.5-5.0)	HI FRQ 2.0kHz (800Hz-8.0kHz)	HI Q 1.0 (-15-15dB)	LPF THRU (1.0kHz-10.0kHz, THRU)	DLY 0.1ms (0.1-400.0ms)		100% (0-100%)	100% (0-100%)

## CIRCUIT BOARD LAYOUT

U.S. & Canadian models



- Note 1.) This Circuit Board layout shows the U.S. and Canadian specifications.  
 Note 2.) For the departures of wirings between destinations, refer to the figures at left.  
 Note 3.) After completing inspection, make sure the SW103, 104 and SW105 are set at NORMAL.

Adjustment Pots:  
 VR101 . . . . .A/D gain adjustment  
 VR102 . . . . .D/A gain adjustment  
 VR103 . . . . .A/D offset adjustment

## CHECKS AND ADJUSTMENTS

### 1. PREPARATIONS

#### 1-1 Preparatory Settings

- Unless otherwise specified, the volumes and switches on the front panel are to be set as follows:  
 INPUT VOL. . . . .MAX  
 INPUT LEVEL SW. . . . .+4 dB  
 OUTPUT LEVEL SW. . . . .+4 dB
- Leave the slide switches SW103, SW104 and SW105 within the AD circuit set to the TEST position.
- The load of the OUTPUT L and R connectors are to each be serially connected to a load resistors (300Ω + 300Ω).

#### 1-2 Measuring Instruments

- Prepare the following: AF signal generator, electronic voltmeter, distortion meter, oscilloscope, load resistors on.
- For the distortion measurement, a low-pass filter with cut-off frequency of 80kHz and -6dB/OCT must be used.
- For the noise level measurement, a low-pass filter with the cut-off frequency of 12.7kHz and -6dB/OCT must be used.
- The output impedance of the AF signal generator must be less than 600Ω.
- The input impedance of the measuring instruments must be over 1 MΩ.

### 2. INSPECTION

#### 2-1 Gain

##### 2-1-1 Total gain (Reverberation signal)

When the input signals below are applied to the INPUT connector, switching of the LEVEL switch enables the output signals of the table below to be obtained at the OUTPUT L and R connectors. (After inspection, set the LEVEL switch to +4dB.)

INPUT LEVEL	OUTPUT LEVEL	INPUT	OUTPUT
+4	+4	-6 dBm	+4 ± 1 dBm
+4	-20	-6 dBm	-20 ± 3 dBm
-20	+4	-30 dBm	+4 ± 3 dBm
-20	-20	-30 dBm	-20 ± 3 dBm

##### 2-1-2 Bypass circuit

When the BYPASS switch is switched ON according to the conditions of Table 2-1-1, output signals of +4 ± 2 dBm are obtained at the L and R OUTPUT connectors. (After inspection, set the BYPASS switch to OFF.)

### 2-2 Frequency Characteristics

When an input signal of approximately -10 dBm is applied from the INPUT connector in the according to the status of Table 2-1-1 and the conditions stated in section 2-1-2, the frequency characteristics of the OUTPUT L and R connectors are within the range listed in the table below. The reference frequency used is 1kHz.

	20Hz ~ 11kHz	12kHz	20kHz
2-1-1	+1 ~ -2	+1 ~ -5	-
2-1-2	+1 ~ -2	+1 ~ -2	+1 ~ -3

(dB)

### 2-3 Distortion Factor

#### 2-3-1 Maximum output distortion

With the conditions set according to Table 2-1-1, the distortion factor should be less than 0.1%.

#### 2-3-2 Distortion factor of distortionless output

When a 1kHz input signal is applied to the INPUT connector, the distortion factor just before the clipping of the output waveforms at the L and R OUTPUT connectors should be less than 0.02% (OUTPUT waveforms can be observed by utilizing the monitor output of the distortion meter or connect) an oscilloscope to the output load.

#### 2-4 Maximum Output

When a 1kHz input signal is applied to the INPUT connector according to the conditions of section 1-1, the maximum level of the output signal at the L and R OUTPUT connectors should be +18 dBm with a distortion factor of less than 1%.

#### 2-5 Meter Sensitivity

When a 1kHz input signal is applied to the INPUT connector according to the conditions of section 1-1, and the input signal has been adjusted so that an output signal of +10 ± 4 dBm can be obtained at the L and R OUTPUT connectors, the '0' level of the level meter is illuminated. At this point, all LED indicators below the '0' level are illuminated.

#### 2-6 Muting Circuit

After the POWER switch is turned ON, muting is effective for three to four seconds, and no output signals are generated. After this time delay output signals can be obtained at each OUTPUT connector. When the POWER switch is turned OFF, muting becomes effective so that no clicking noise is generated.

### 3. ADJUSTMENT

#### 3-1 A/D Gain Adjustment

Apply an input signal of +8.5 dBm at 1kHz to the INPUT connector and adjust VR 101 so that the output signal is clipping slightly at the L OUTPUT connector. Adjust VR 103 so that the clipping signal is vertically symmetrical. (Observe the distortion waveforms by utilizing the monitor output of the distortion meter or connect the oscilloscope to the output load.)

Afterwards, adjust VR 101 until the distortion waveforms of the L OUTPUT connector for minimum distortion.

#### 3-2 D/A Gain Adjustment

With the same input conditions as stated in section 3-1, adjust VR 102 so that the output signal of the L OUTPUT connector becomes +18.5 ± 0.2 dBm.

#### 3-3 Noise Level Adjustment

After performing sections 2-1 through 2-6, set the slide switches SW102, 104, and 105 on the AD circuit board to the NORMAL position and set the BALANCE level to '0' (DIRECT).

When the INPUT is opened, the noise levels of the L and R OUTPUT connectors should be less than -65dBm. If noise levels are not within rated levels, adjust VR 103 on the AD circuit board so that the noise levels are within rated values.

Note that this adjustment must be performed approximately five seconds after the POWER switch is switched ON. At this point, perform the Offset Check using Test Program # 5, after the level clicking noise or offset has been minimized, and verify that the noise meets the previously stated specification.



## ■ TEST PROGRAM

### 1) Contents of Test Program

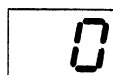
- ① Operation Check of Liquid Crystal Display (LCD) Unit
- ② LED Illumination Check
- ③ Switch Operation Check
- ④ MIDI Input/Output Check
- ⑤ A/D Offset Adjustment
- ⑥ DRAM Check

The SPX90 has built-in test programs for checking its various functions. The checking procedures and contents of the test programs are described below.



Note that check sum of the ROM, the S-RAM read/write test, and the checking of the control circuits of DSP and MOD are automatically performed during normal operation by the main program when the POWER switch is switched ON.

### 2) Activation of the Test Program

To activate the Test Program depress and hold down the PARAMETER key and FOOT TRIGGER key, while turning ON the POWER switch of the SPX90.



### 3) Selection of Each Routine of the Test Program

After selecting the desired routine using the MEMORY UP  and DOWN  keys, press the RECALL key, to initiate the test.

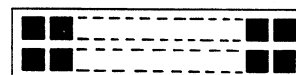
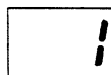
### 4) Return to Normal Operation From the Test Program

Normal operation is restored after Test 6 is completed, providing that Tests 1 through 5. An alternate exit procedure can be performed by incrementing to 90 on the LED readout and then press the RECALL key. Normal operation can be restored regardless of whether or not Tests. 1 through 5 were executed.

#### ① Test Program # 1. . . . . LCD Check

Press the MEMORY UP key, to select Routine No. 1, then press the RECALL key, to initiate the test.

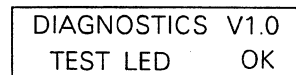
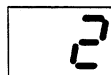
This test repeats the ON/OFF operation of all LCD display dots five times, to visually confirm that the entire display area is normal.



#### ② Test Program # 2. . . . . LED Illumination Check

Press the MEMORY key to select Routine No. 2, then press the RECALL key to initiate the test.

This test illuminates the seven-segment LED in the sequence of 0, 11, 22 to 99. The test illuminates the LED indicators of the key switches in the following sequence: PARAMETER, BALANCE, UTILITY, FOOT TRIGGER, and BYPASS. Afterwards, all segments of the seven-segment LED display and all LED indicators of the key switches are illuminated for about three seconds.

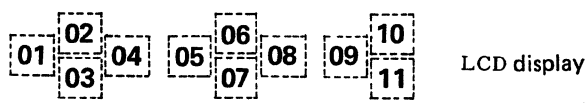
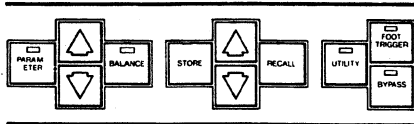


SPX90

- ③ **Test Program #3. . . . . Switch Operation Check**  
 Press the MEMORY UP key, to select Routine No. 3, then press the RECALL key to initiate the test. Now press the following keys in sequence . . . PARAMETER, Parameter UP (▲), Parameter Down (▼), BALANCE, UTILITY, FOOT TRIGGER, and BYPASS. This procedure causes the numbers of the LCD Unit to change from 01 to 11 as shown in the figure below. If all switches are good then 'OK' is displayed on the LCD Unit.

3

DIAGNOSTICS V1.0  
TEST SWITCH 00



NOTE: If the keys are not pressed in the proper sequence, the LCD readout will display be NG (No GOOD). To restore the test, press the RECALL key then start the procedure from the beginning.

- ④ **Test Program #4. . . . . MIDI Input/Output Check**  
 Connect the MIDI IN connector to the MIDI THRU connector using the MIDI cable. Set SW 105 on the AD circuit board to the TEST position. Press the MEMORY key, to select Routine No. 4, then press the RECALL key to initiate the test.

4

DIAGNOSTICS V1.0  
TEST MIDI OK

NOTE: In case of a malfunctioning MIDI input/output or improper connection of the MIDI connectors, "NG" will be displayed.

- ⑤ **Test Program #5. . . . . A/D Offset Adjustment**  
 Set SW103 and SW104 on the AD circuit board to the TEST position. Connect the L and R OUTPUT to a power amplifier and set the controls so that sound can be heard from the speakers. Press the MEMORY UP key, to select Routine No. 5, then press the RECALL key to initiate the test. The phase of the output signal from the OUTPUT connector is inverted approximately every 500 msec and an offset voltage is present, confirmation can be performed by listening to the clicking sound that is produced. Adjusting VR 103 on the AD circuit board, so that the clicking sound is minimized.

DIAGNOSTICS V1.0  
TEST DRAM \*\*\*

- ⑥ **Test Program #10 ~ #17. . . . . DRAM Check**  
 Press the MEMORY UP key, to select Routine Nos. 10 to 17, then press the RECALL key to initiate the test. The LCD readout will display the code which corresponds to the appropriate test as shown in Table 6-1.

Routine No.	MSB	IC Number	LSB	* * *
10	116	117 118	119	THR
11	117	118 119	120	04B
12	118	119 120	121	08B
13	119	120 121	0000	12B
14	120	121 0000	0000	16B
15	121	0000 0000	0000	20B
16	1000	0000 0000	0000	-MX
17	0111	1111 1111	1111	+MX

(Table 6-1)

## ■ MIDI DATA FORMAT

### ● Channel Information

#### ○ Channel Voice Message

##### (1) Program Change

Status	1100nnnn	(Cn)	n = channel no.
Program no.	0ppppppp		p = 0 ~ 127

##### (2) Key Off

Status	1000nnnn	(8n)	n = channel no.
Note no.	0kkkkkkk		k = 0 ~ 127
Velocity	0vvvvvvv		v = 0 ~ 127

##### (3) Key On

Status	1001nnnn	(9n)	n = channel no.
Note no.	0kkkkkkk		k = 0 ~ 127
Velocity	0vvvvvvv		v = 0 ~ 127

### ● System Information

#### ○ System Exclusive Message

Status	11110000	(F0)	
ID no.	01000011	(43)	
Substatus/ch. no.	0000nnnn	(0n)	n = channel no.
Parameter no.	nnnnnnnn		
Data no.	dddddddd		
Eox (End of exclusive info.)	11110111	(F7)	

[ Digital Sound Processor ] Date : 10/5, 1985  
 Model SPX90 MIDI Implementation Chart Version : 1.0

Function ...	Recognized	Remarks
Basic Default	: 1 - 16	: memorized
Channel Changed	: 1 - 16	:
Mode Default	: OMNI OFF/OMNI ON	: memorized
Mode Messages	: x	:
Mode Altered	: x	:
Note Number : True voice	: o 0 - 127 : x	: X1
Velocity Note ON	: x	:
Velocity Note OFF	: x	:
After Key's	: x	:
Touch Ch's	: x	:
Pitch Bender	: x	:
	: x	:
Control	:	:
Change	:	:
	:	:
	:	:
	:	:
Prog Change : True #	: o 0 - 127 :	: X2
System Exclusive	: o	:
System : Song Pos	: x	:
System : Song Sel	: x	:
Common : Tune	: x	:
System : Clock	: x	:
Real Time : Commands	: x	:
Aux : Local ON/OFF	: x	:
Aux : All Notes OFF	: x	:
Mes- : Active Sense	: x	:
Pages:Reset	: x	:
Notes	: X1 Note ON/OFF is recognized only for pitch : change and freeze B. : X2 For program 1 - 128, memory #1 - #90 is : selected.	:

Mode 1 : OMNI ON, POLY      Mode 2 : OMNI ON, MONO      o : Yes  
 Mode 3 : OMNI OFF, POLY    Mode 4 : OMNI OFF, MONO     x : No

SPX90

## LSI DATA TABLE

### YM3804 Digital Signal Processor (DSP)

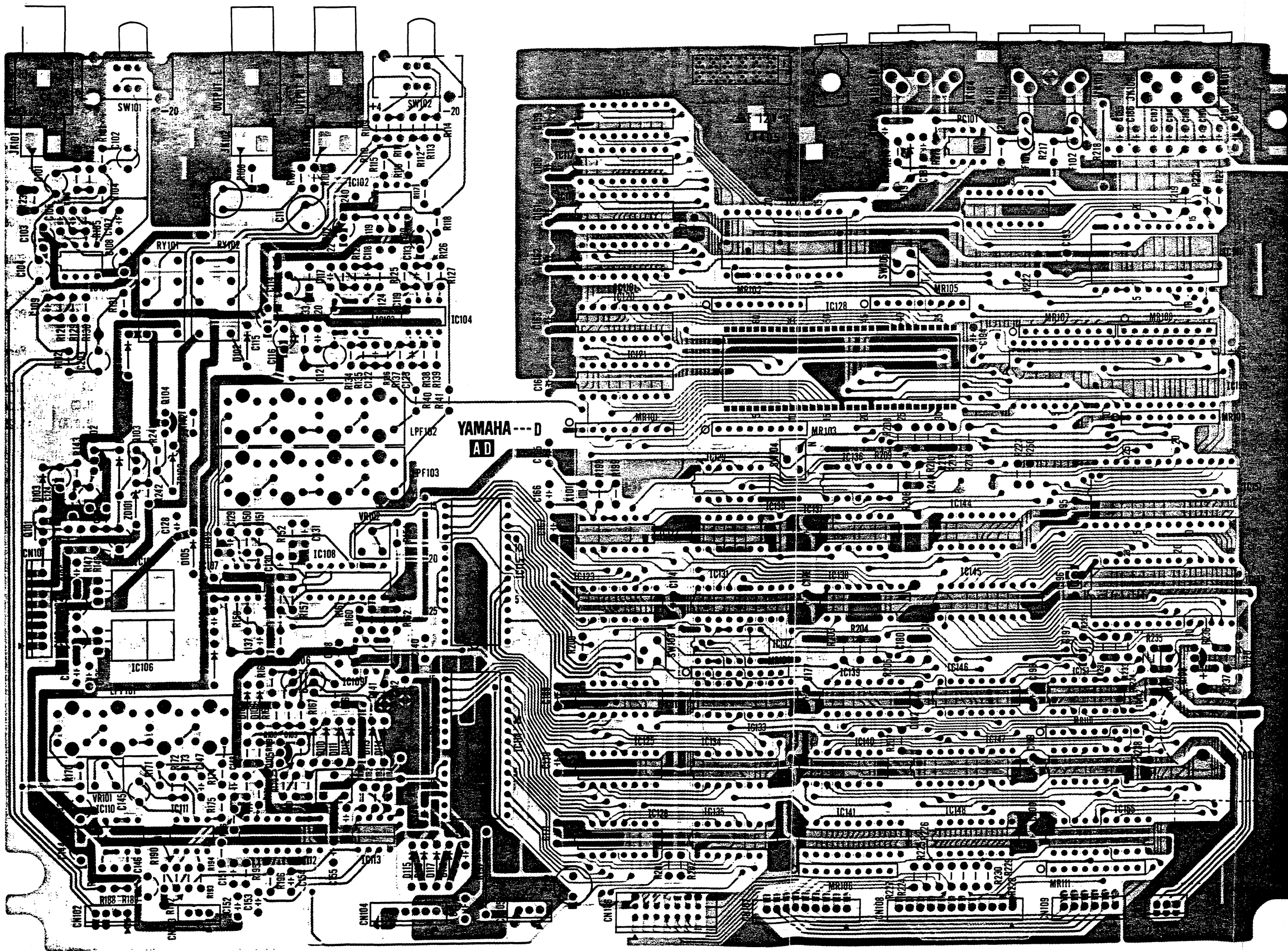
Pin No.	Name	I/O	Function	Pin No.	Name	I/O	Function
1	MDAT 15	I/O	I/O pins connected to memory data bus	64	V S S	—	Ground (0 V)
2	MDAT 14	I/O		63	MDAT 16	I/O	I/O pins connected to memory's data bus
3	MDAT 13	I/O		62	MDAT 17	I/O	
4	MDAT 12	I/O		61	MDAT 18	I/O	
5	MDAT 11	I/O		60	MDAT 19	I/O	
6	MDAT 10	I/O		69	MDAT 20	I/O	
7	MDAT 9	I/O		68	MDAT 21	I/O	
8	MDAT 8	I/O		67	MDAT 22	I/O	
9	MDAT 7	I/O		66	MDAT 23	I/O	
10	MDAT 6	I/O		65	M O D 0	I	
11	MDAT 5	I/O	64	M O D 1	I		
12	MDAT 4	I/O	63	M O D 2	I		
13	MDAT 3	I/O	62	M O D 3	I		
14	MDAT 2	I/O	61	M O D 4	I		
15	MDAT 1	I/O	60	M O D 5	I		
16	MDAT 0	I/O	49	M O D 6	I		
17	S I 1	I	48	M O D 7	I		
18	S I 0	I	47	$\overline{T C}$	I	Initial Clear signal input	
19	S O 1	O	46	$\overline{C S}$	I	Chip Select input	
20	S O 0	O	45	C L K	I	Master Clock input	
21	X M D	I	44	SYNCW	I	System sync. signal input	
22	X C L K	I	43	TEST 1	I	Chip test input (+5 V)	
23	$\overline{T O}$	O	42	TEST R	I		
24	$\overline{C R S}$	I	41	MADR 0	O	Outputs connected to memory's address bus	
25	C D O	O	40	MADR 1	O		
26	C D I	I	39	MADR 2	O		
27	T M 1	O	38	MADR 3	O		
28	$\overline{R E F}$	O	37	MADR 4	O		
29	$\overline{O E}$	O	36	MADR 5	O		
30	$\overline{W E}$	O	35	MADR 6	O		
31	$\overline{C A S}$	O	34	MADR 7	O		
32	$\overline{R A S}$	O	33	V D D	—	Power supply input (+5 V)	

## YM3807 Modulation Data Generator (MOD)

Pin No.	Name	I/O	Function	Pin No.	Name	I/O	Function
1	N C	I	Initial Clear signal input (presently not used)	24	V S S	—	G N D
2	TEST 0	I	} Chip test inputs	23	MDSO 1	O	} Serial waveform data outputs
3	TEST 1	I		22	MDSO 0	O	
4	M D 7	O	} 8-bit parallel multiplexed outputs for waveform data	21	MDSI 1	I	} Data inputs to MOD's internal adder
5	M D 6	O		20	MDSI 0	I	
6	M D 5	O		19	C D I	I	
7	M D 4	O		18	C D O	O	Serial data output used to connect serial interfaces in cascade
8	M D 3	O		17	X C L K	I	Data send/receive clock input for asynchronous mode
9	M D 2	O		16	X M D	I	Synchronous (L)/asynchronous (H) select input for serial interfaces CDI and CDO
10	M D 1	O		15	$\overline{C R S}$	I	Reset input to reset the serial input CDI data counter
11	M D 0	O		14	SYNCW	I	System sync. signal input
12	V D D	—	+ 5 V	13	C L K	I	Master clock input

■ CIRCUIT BOARDS

● AD CIRCUIT BOARD

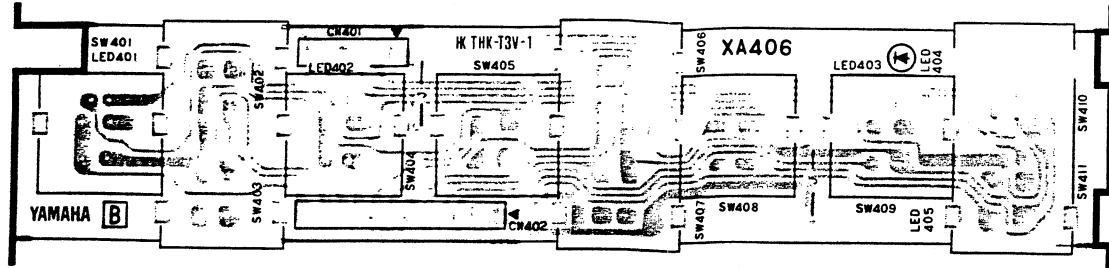


Circuit Board :XA405 B

- IC101,103,104,
- 110,111 :NJM4558DV (IG001390)
- IC102 :NJM4556 (XA772001)
- IC105 :NJM7815A (IG147400)
- IC106 :NJM7915A (IG147500)
- IC107,113 :M5238P (XA013001)
- IC108,112 :TC4053BP (IG055100)
- IC109 :IR9311 (IG134900)
- IC114,115 :PCM54HP (XA566001)
- IC116-121 :M5M4416 (IG122320)
- IC122,132 :74HC04 (IR000480)
- IC123,124 :74HC595 (IR059500)
- IC125 :HD14549B (IR104500)
- IC126 :HD14559BP (IR104600)
- IC127 :YM3807 (IT380700)
- IC128 :YM3804 (IT380400)
- IC129,137 :74HC74 (IR007480)
- IC130,138 :74HC163 (IR016380)
- IC131 :TBP28L22N (XA542001)
- IC133,147 :74HC273 (IR027380)
- IC134,135 :TC74HC166 (IR016600)
- IC136 :HD74LS266 (XA379001)
- IC139,143 :TD62003P (IG127300)
- IC140 :74HC174 (IR017480)
- IC141 :TC74HC245 (IR024500)
- IC142 :PST518 (IG124300)
- IC144 :74HC139 (IR013980)
- IC145 :74HC373 (IR037380)
- IC146 :74HC138 (IR013880)
- IC148 :TD62506P (IG138700)
- IC149 :HD6350P (IG132700)
- IC150 :HD6303RP (IG093500)
- IC151 :EPROM (XA519001)
- IC152 :TC5565L-12 (IG148500)
- IC153 :74HC14 (IR001480)
- IC154 :74HC367 (IR036780)
- IC155 :74HC244 (IR024480)
- Q101,103,107 :2SC1815(Y)
- Q102,104,105,
- 108 :2SA1015(Y)
- Q106 :2SC1815Twin
- D101-104,
- 107-120 :1SS176
- D105,106 :W03B
- ZD101,102 :RD5.6EB2
- LPF101-103 :PFB-4
- RY101,102 :RZ-12
- PC101 :TLP552
- X101 :Ceramic Resonator 4MHz
- F101,102 :0.0022μF

SPX90

● KY CIRCUIT BOARD

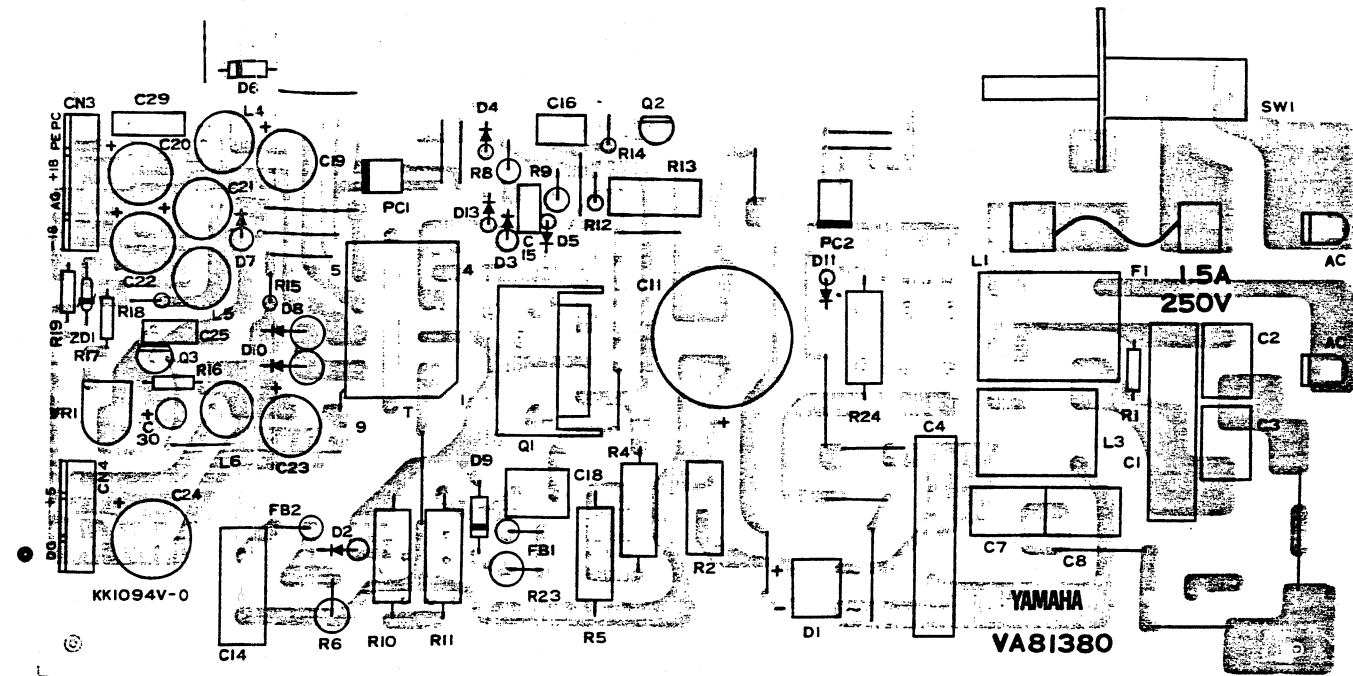


Circuit Board :XA406 B

3NA-VA84910 Δ

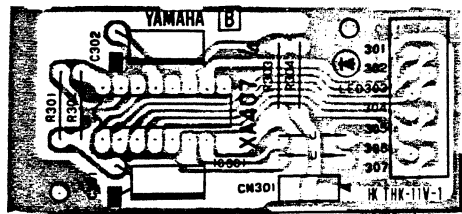
LED :VA26230

● POWER SUPPLY CIRCUIT BOARD  
JAPANESE MODEL (VA81380)



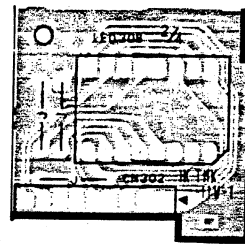
Q1 (J,U,C)	:2SC2555
(H,D,A)	:2SC2792
Q2	:2SD1207
Q3	:2SC2634
D1 (J,U,C)	:DF04M
(H,D,A)	:DF06M
D2,9	:ERB4406
D3	:ERB4302
D4,5,13	:1SS84
D6,7	:15DF2,15DF4
D8,10	:S2K20H
D11 (J,U,C)	:1S1555
D12 (H,D,A)	:DF06M
ZD1	:EQA02-06D
PC1,2 (J,U,C)	:PC-817
(H,D,A)	:PC-511
FB1,2	:Ferrite Bead
F1 (J)	:1.5A 250V
(U,C)	:2.0A 250V
(H,D,A)	:1.25A 250V

● FP CIRCUIT BOARD 1/4

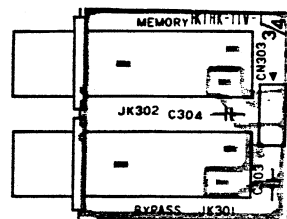


3NA-VA84920-5X Δ

● FP CIRCUIT BOARD 2/4



● FP CIRCUIT BOARD 3/4



Circuit Board :XA407 B

IC301 :IR2E19

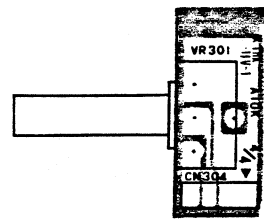
LED301-303 :VA90250 (OR)

LED304-307 :VA90250 (GR)

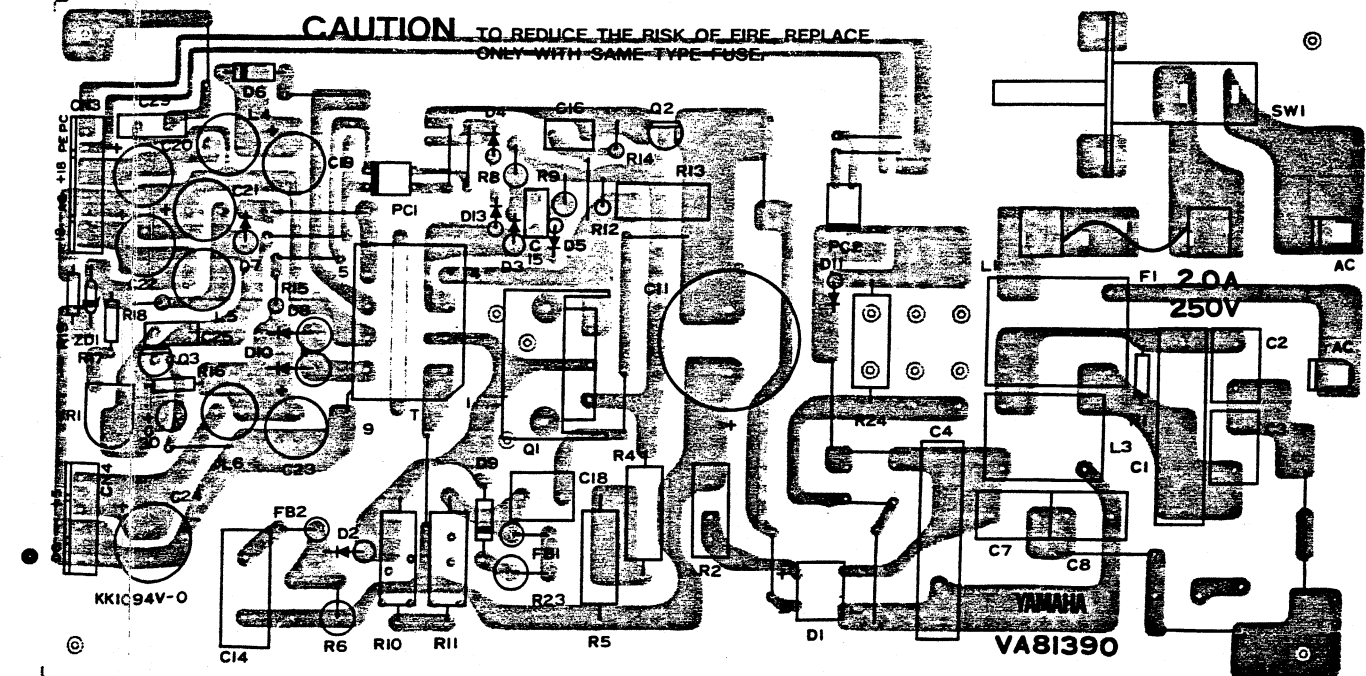
LED308 :VA02600

VR301 :VA75760

● FP CIRCUIT BOARD 4/4



AMERICAN MODEL (VA81390)







Notes DESTINATION ABBREVIATIONS	
J : Japanese model	A : Australian model
U : U.S.A. model	E : European model
C : Canadian model	D : West German model
X : General model	B : British model
M : South African model	I : Indonesian model
H : North European model	

# PARTS LIST

## Electrical Parts

Ref	Part No	Description	部品名	Remarks	ランク
*	VA849000	AD Circuit Board	ADボード		
	IG001390	IC	NJM4558DV	OP AMP.	03
	XA772001	IC	NJM4556	OP AMP.	
	XA013001	IC	M5238P	OP AMP.	04
	IG147400	IC	NJM7815A	-15V Regulator	04
	IG147500	IC	NJM7915A	-15V Regulator	04
	IG134900	IC	IR9311	Comparator	04
	IG055100	IC	TC4053BP	MPX	05
	IG104500	IC	HD14549B	REG	08
	IG104600	IC	HD14559B	REG	08
	IG124300	IC	PST518A	Reset	03
	IR000480	IC	M74HC04P	INV	
	IR001480	IC	M74HC14P	INV	
	IR007480	IC	M74HC74P	DFF	
	IR013880	IC	M74HC138P	DEC	
	IR013980	IC	M74HC139P	DEC	
	IR016380	IC	M74HC163P	CNT	
	IR016600	IC	TC74HC166P	S.REG	05
	IR017480	IC	M74HC174P	D.PF	
	IR024480	IC	M74HC244P	BUS.BUF	
	IR024500	IC	TC74HC245P	BUS.BUF	07
	IR027380	IC	M74HC273P	D.PF	
	IR036780	IC	M74HC367	BUS.DRIV	
	IR037380	IC	M74HC373P	D.LATCH	
	IR059500	IC	TC74HC595	S.REG	06
*	XA379001	IC	HD74LS286P	EX.NOR	03
	IG093500	IC	HD6303RP	8BIT CPU	16
	IG132700	IC	HD6350P	Interface	
	IG122320	IC	M5M4416P-12	64K D-RAM	10
	IG148500	IC	TC5565L-12,15	64K S-RAM	21
*	XA542001	IC	TBP28L22M	256K BP-ROM	08
*	XA519001	IC	DSP V1.0	EP ROM	
	IT380400	IC	YK3804	DSP	17
	IT380700	IC	YK3807	MOD	15
*	XA566001	IC	PCN54HP	DAC	12
	IG127300	Transistor Array	TD62003P	トランジスタアレイ	04
	IG138700	Transistor Array	TD62506P	トランジスタアレイ	03
	IZ000200	Transistor Array	2SC1815	トランジスタアレイ	03
	IK000470	Photo Coupler	TLP552	フォトカプラー	06
	IA101520	Transistor	2SA1015(Y)	トランジスタ	03
	IC181520	Transistor	2SC1815(Y)	トランジスタ	03
	VA106500	Diode	1SS176	ダイオード	
	IH000720	Diode	V03B	ダイオード	01
	IF002140	Zener Diode	RD5.6EB2	ツェナーダイオード	01
	HL313680	Metal Oxide Film Resistor	6.8Ω 1W	酸化膜抵抗	01
	HL315100	Metal Oxide Film Resistor	100Ω 1W	酸化膜抵抗	01
	HZ004660	Resistor Array	10KΩ × 8	抵抗アレイ	RMLS8-103J
	HZ004740	Resistor Array	4.7KΩ × 8	抵抗アレイ	RMLS8-472J
	VB135200	Semivariable Resistor	3KΩ	半固定メニューム	01
	VB135500	Semivariable Resistor	30KΩ	半固定メニューム	01
	FZ004110	Semiconductive Ceramic Cap.	0.1μF 16V	半導体セラコン	01
	FI363220	EMI Filter	22000P	EMIフィルタ	02
	VA024200	Filter	LCフィルタ-LP	LCフィルタ-LP	07
	QU004800	Ceramic Resonator (crystal)	4MHz	セラミック共振子	03
	KA401270	Slide Switch	SSS212	スライドスイッチ	03
	KA401280	Slide Switch	SSP32204	スライドスイッチ	03
	LB301800	Phone Jack	Mono	ホンジャック	03
	LB500590	DIN Jack	5P	DINジャック	02
	LB605820	DIN Jack	8P	DINジャック	03
	KC001300	Relay	RZ-12	リレー	07
	LB603900	IC Socket	DL2-24A	ICソケット	05
	LB606050	IC Socket	DL2-28A	ICソケット	05
	VA024500	IC Socket	DICS-64AS	ICソケット	08
	VA030300	Base Post Connector	3P	ベースポスト	01
	VA030400	Base Post Connector	4P	ベースポスト	01
	VA030600	Base Post Connector	6P	ベースポスト	01
	VA030800	Base Post Connector	8P	ベースポスト	01
	VA030900	Base Post Connector	9P	ベースポスト	01
	VA031200	Base Post Connector	12P	ベースポスト	01
	VA882100	Header	14P	ヘッド	02
	ILO00690	Sheet		放熱シート	01
	AA834370	DIN Socket Holder		DINソケットホルダー	
	BB807110	Ground Plate		アース金具	
	BB068370	Ground Plate		アース金具	
	EB326056	Flat Head Screw	2.6×5 FCM3-BL	皿小ネジ	PACK
	EB330108	Flat Head Screw	3×10 FCM3-BL	皿小ネジ	PACK
	EV103300	Hexagonal Nut	φ3 ZMC2-BL	六角ナット	PACK
	EV303306	Spring Lock Washer	φ3 FCM3-BL	アース金	PACK

\* : New Parts (新規部品) NR

ランク : Japan Only

SPX90

Ref	Part No	Description	部品名	Remarks	ランク
*	VA849100	KY Circuit Board	KYシート		
*	VA262300	LED (Red)	LED		01
*	KA906530	Push Switch	プッシュスイッチ		02
*	VA314300	Switch Escutcheon	スイッチエスカッション		01
*	VA314400	Switch Escutcheon	スイッチエスカッション		01
*	VA849200	FP Circuit Board	FPシート		
*	IG136600	IC	IC	LED DRIV	05
*	VA026000	LED Display	LEDディスプレイ		05
*	VA902500	LED Display	LEDディスプレイ		06
*	VA757800	Rotary Potentiometer	ロータリーポテンション		
*	FZ004110	Semiconductive Ceramic Cap.	半導体セラコン		01
*	LB301800	Phone Jack	ホンジャック		03
*	VA813800	Power Supply Unit	電源ユニット	J	
*	VA813900	Power Supply Unit	電源ユニット	U	
*	VA814000	Power Supply Unit	電源ユニット	C	
*	VA814100	Power Supply Unit	電源ユニット	HDA	
*	IC255500	Transistor	トランジスタ	JUC	05
*	IC279200	Transistor	トランジスタ	HDA	07
*	IX801370	Transistor	2SD1207	トランジスタ	
*	IC263400	Transistor	2SC2634 (R,S,T)	トランジスタ	03
*	IX801380	Diode	DF04M	ダイオード	JUC
*	IX801390	Diode	DF06M	ダイオード	HDA
*	IH001740	Diode	ERB4406	ダイオード	03
*	IX551600	Diode	ERB4302	ダイオード	01
*	IF001380	Diode	1SS84	ダイオード	01
*	IX551590	Diode	15DF2	ダイオード	03
*	IX801400	Diode	S2K20H	ダイオード	03
*	IF000040	Diode	1S1555	ダイオード	JUC
*	IF001470	Zener Diode	RD6.2EB2	ゼナーダイオード	01
*	IK000480	Photo Coupler	PC-817	フォトカプラ	JUC
*	IK000490	Photo Coupler	PC-511	フォトカプラ	HDA
*	HT570540	Trimmer Potentiometer	B1KQ	トリムポテンション	05
*	GX800100	Choke Coil	20MH	チョークコイル	02
*	GX800190	Choke Coil	8MH	チョークコイル	06
*	XX804230	Choke Coil	150 μ H	チョークコイル	04
*	GX800180	Choke Coil	20 μ H	チョークコイル	02
*	GX800160	Power Transformer	TYA010	電源トランス	JUC
*	GX800170	Power Transformer	TYA011	電源トランス	HDA
*	FZ003440	Electrolytic Cap.	1000 μ F 10V	ケミコン	02
*	UJ129220	Electrolytic Cap.	2200 μ F 10V	ケミコン	02
*	KA803610	Power Switch	パワースイッチ		03
*	VA803700	Switch Panel	スイッチパネル		
*	EA230066	Pan Head Screw	3 × 6	ナット	
*	EA230106	Pan Head Screw	3 × 10	ナット	01
*	EV120300	Hexagonal Nut	M3	六角ナット	01
*	EB000340	Fuse	1.5A 250V	ヒューズ	J
*	KB000350	Fuse	2.0A 250V	ヒューズ	UC
*	KB000680	Fuse	1.25A 250V	ヒューズ	HDA
*	BX800040	Ferrite Bead		フェライトビーズ	02

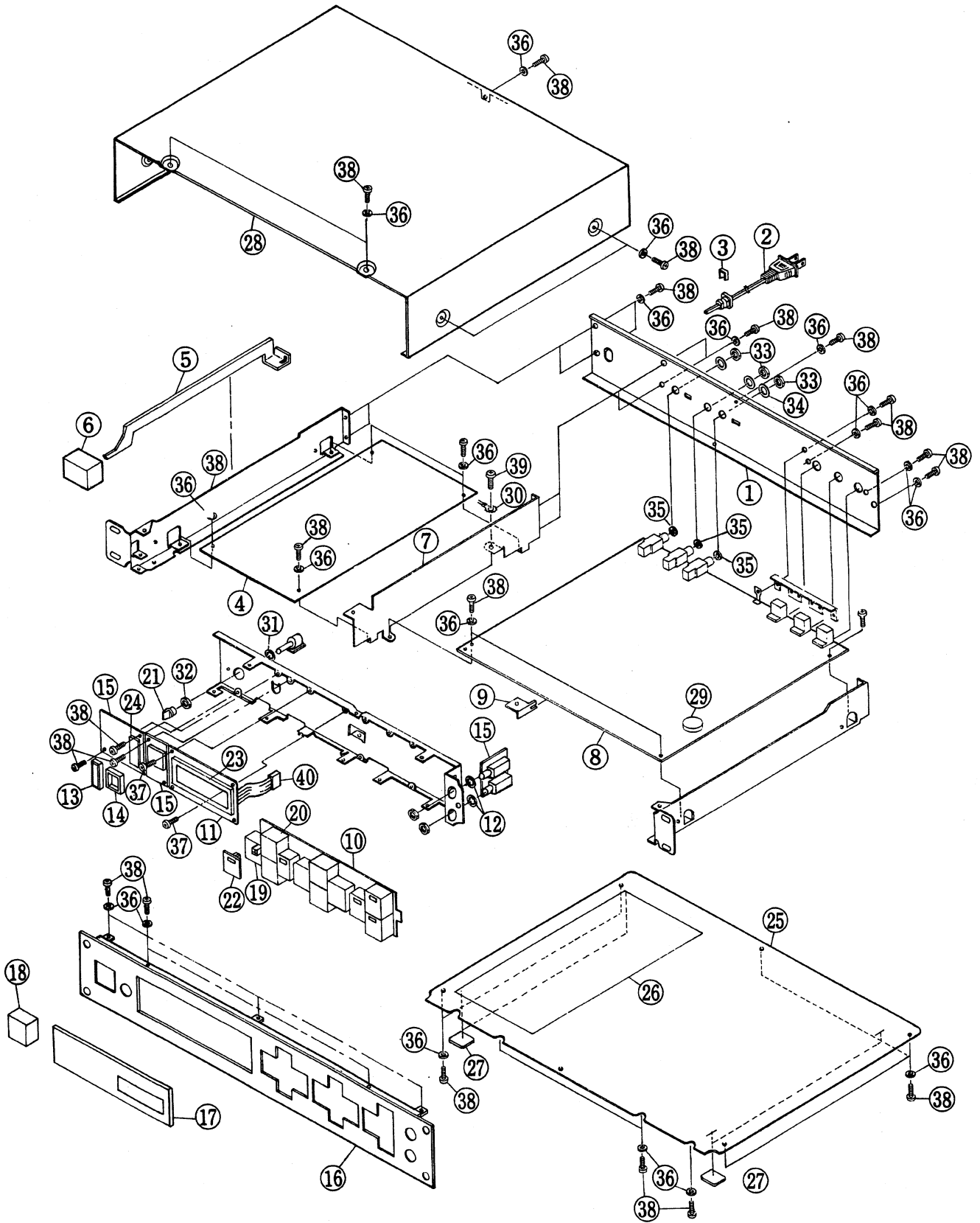
\* : New Parts (新規部品) NR

ランク : Japan Only

SPX90

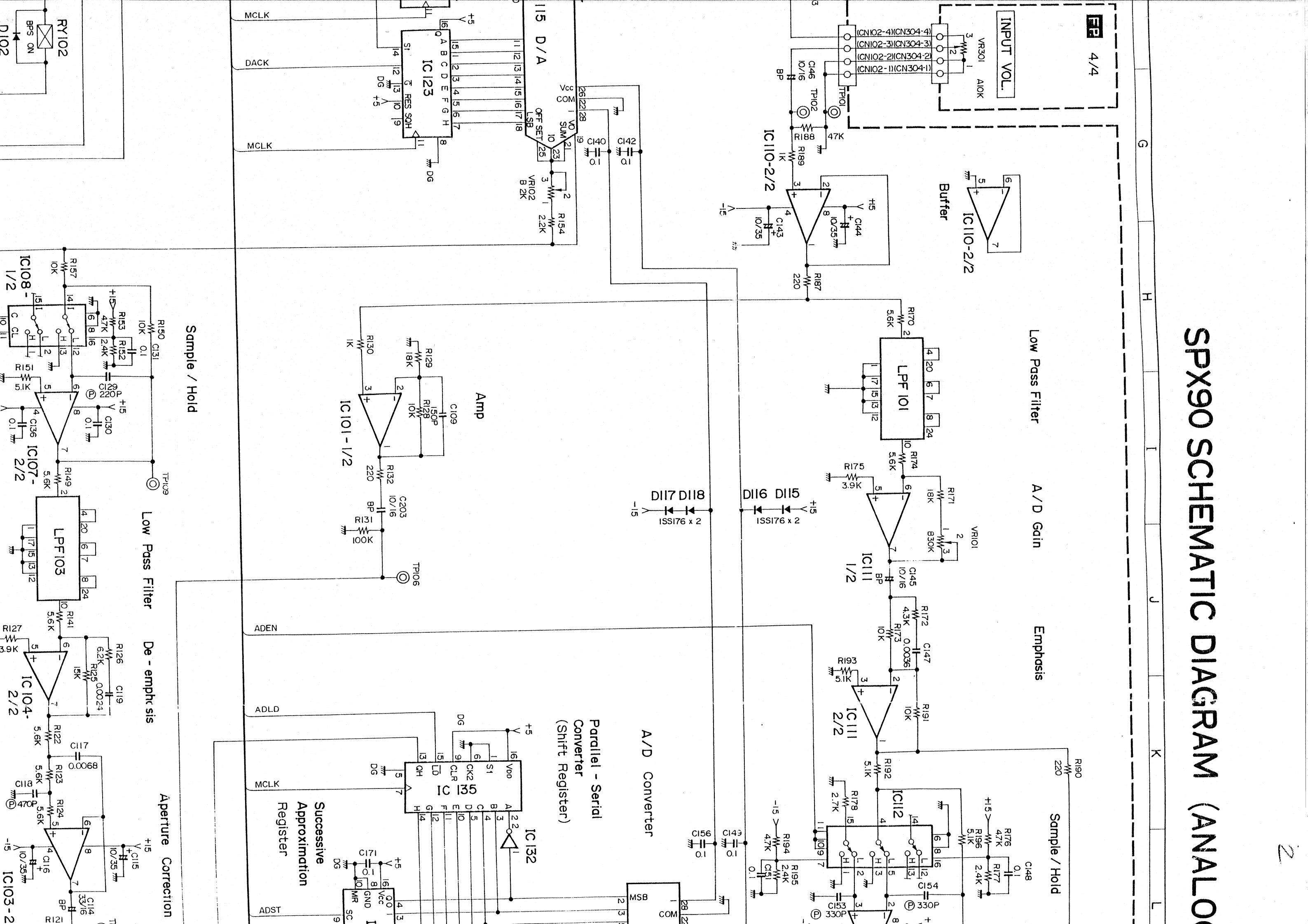
Overall Assembly

SPX90



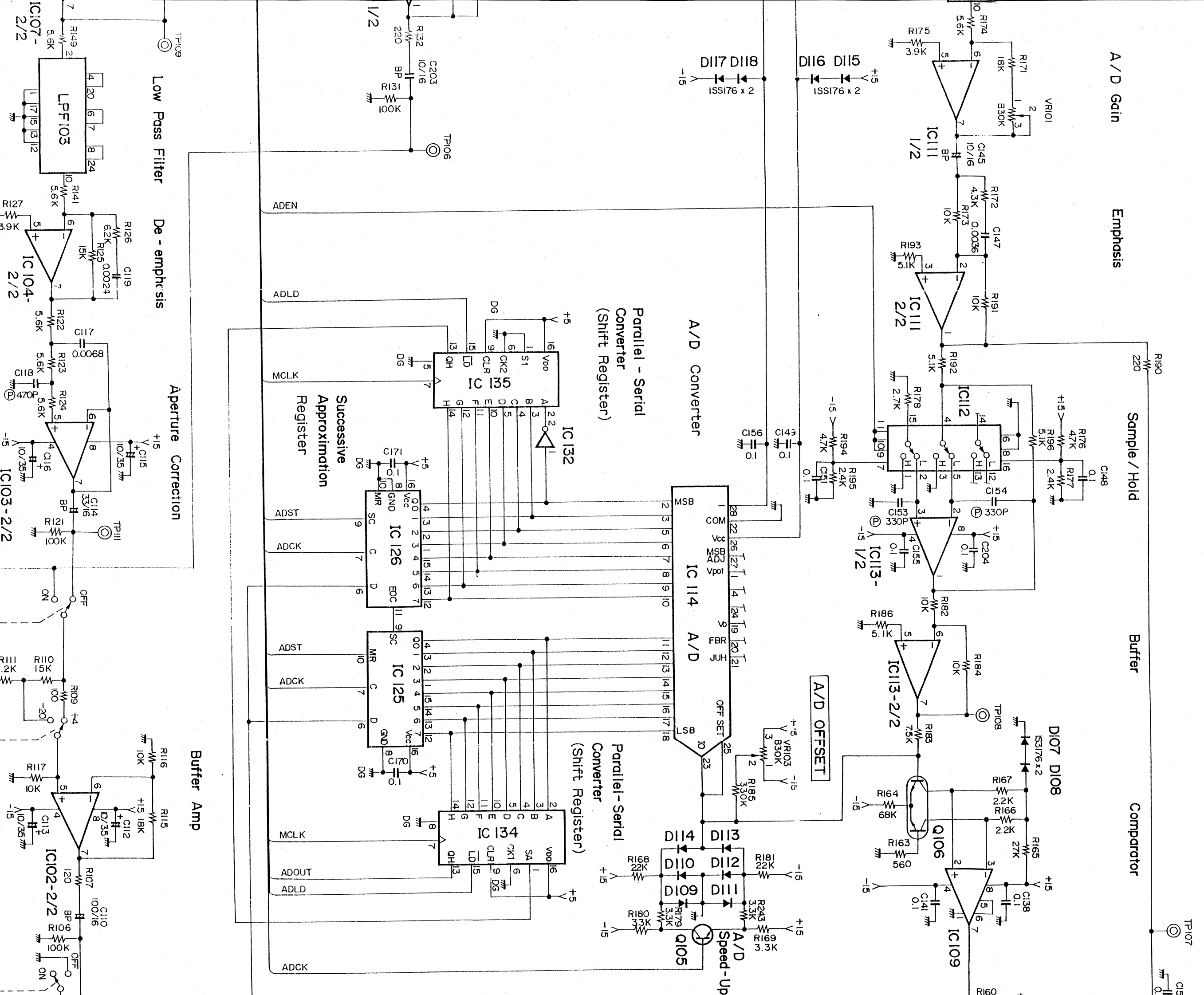


# SPX90 SCHEMATIC DIAGRAM (ANALOG)



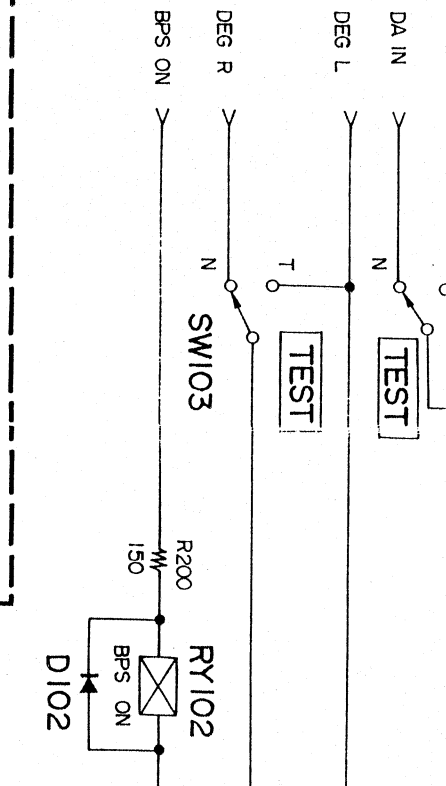
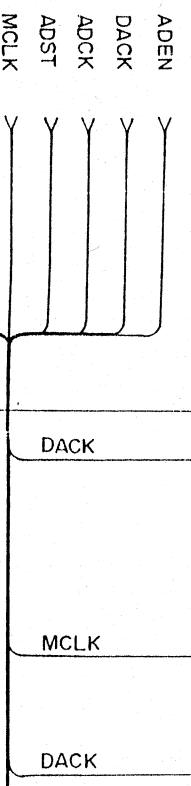
# SCHEMATIC DIAGRAM (ANALOG SECTION)

I J K L M N

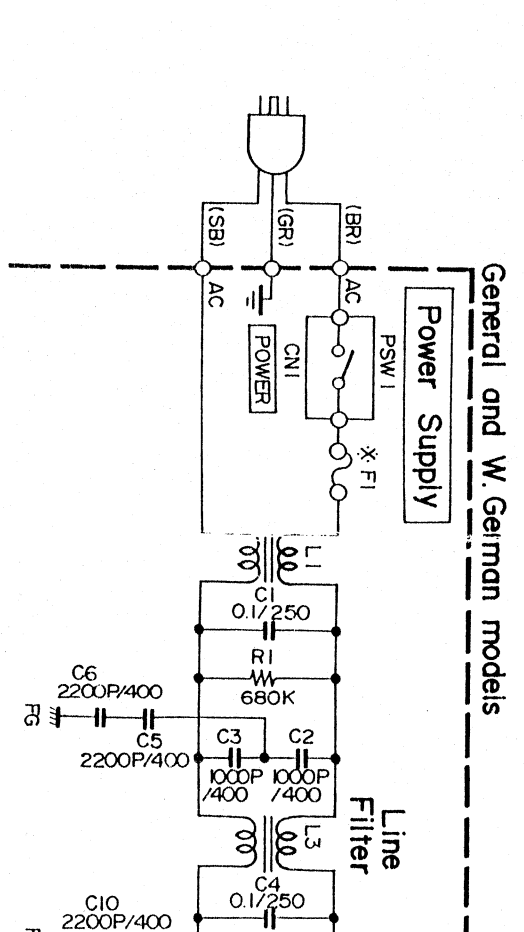
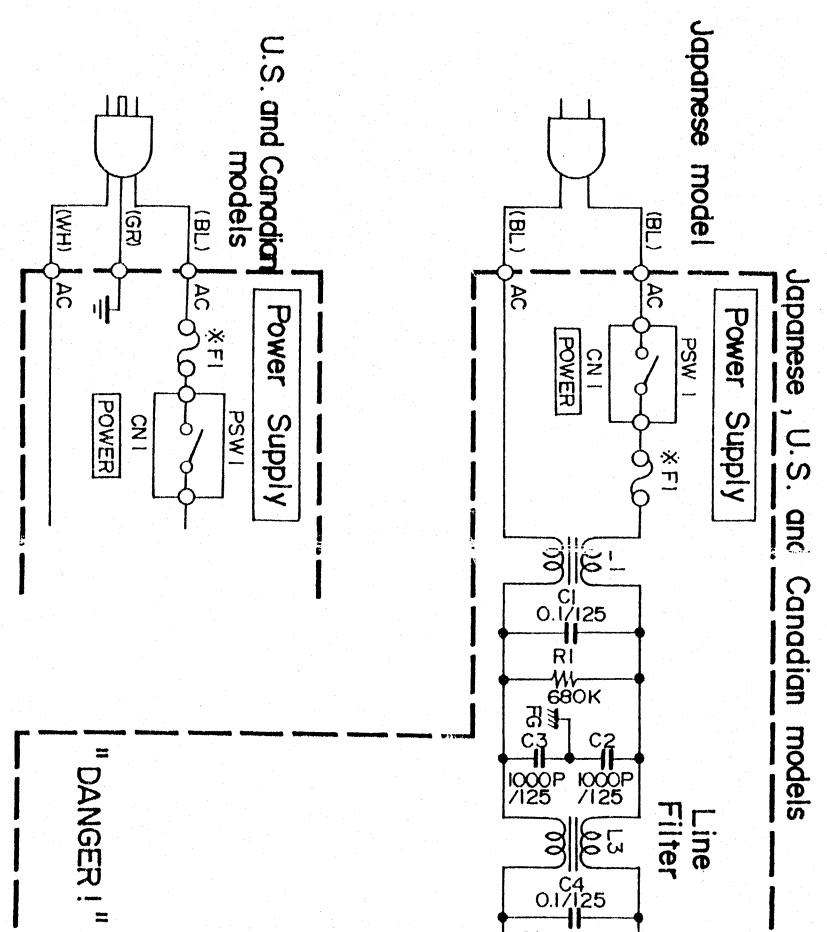








	*F
JAPANESE	1.5A 250V
U.S. CANADIAN	2A 250V
GENERAL and W. GERMAN	T1.25A 250V

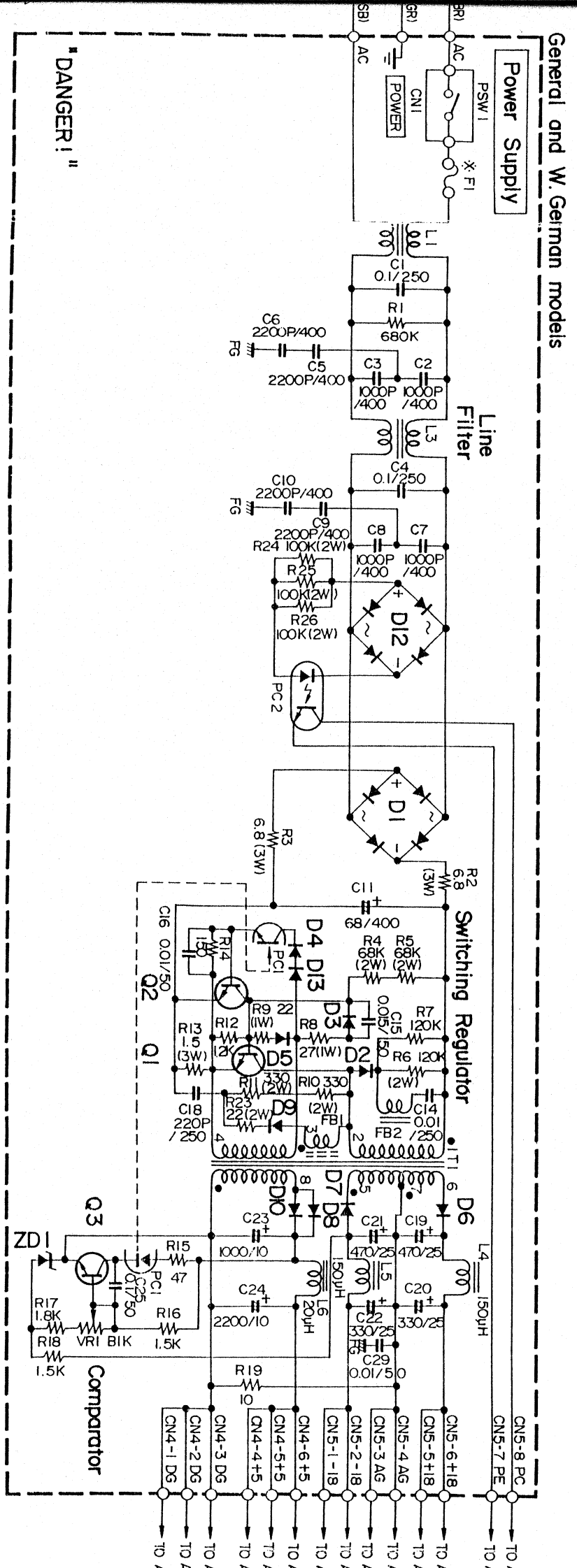
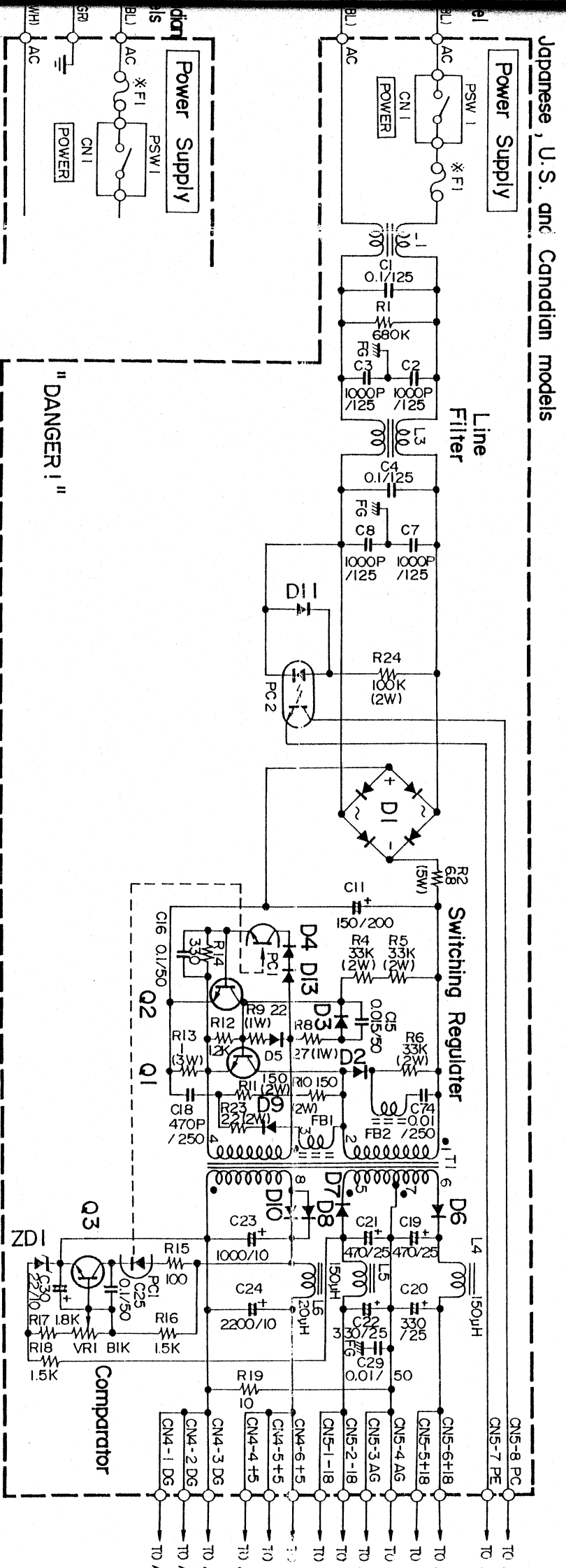
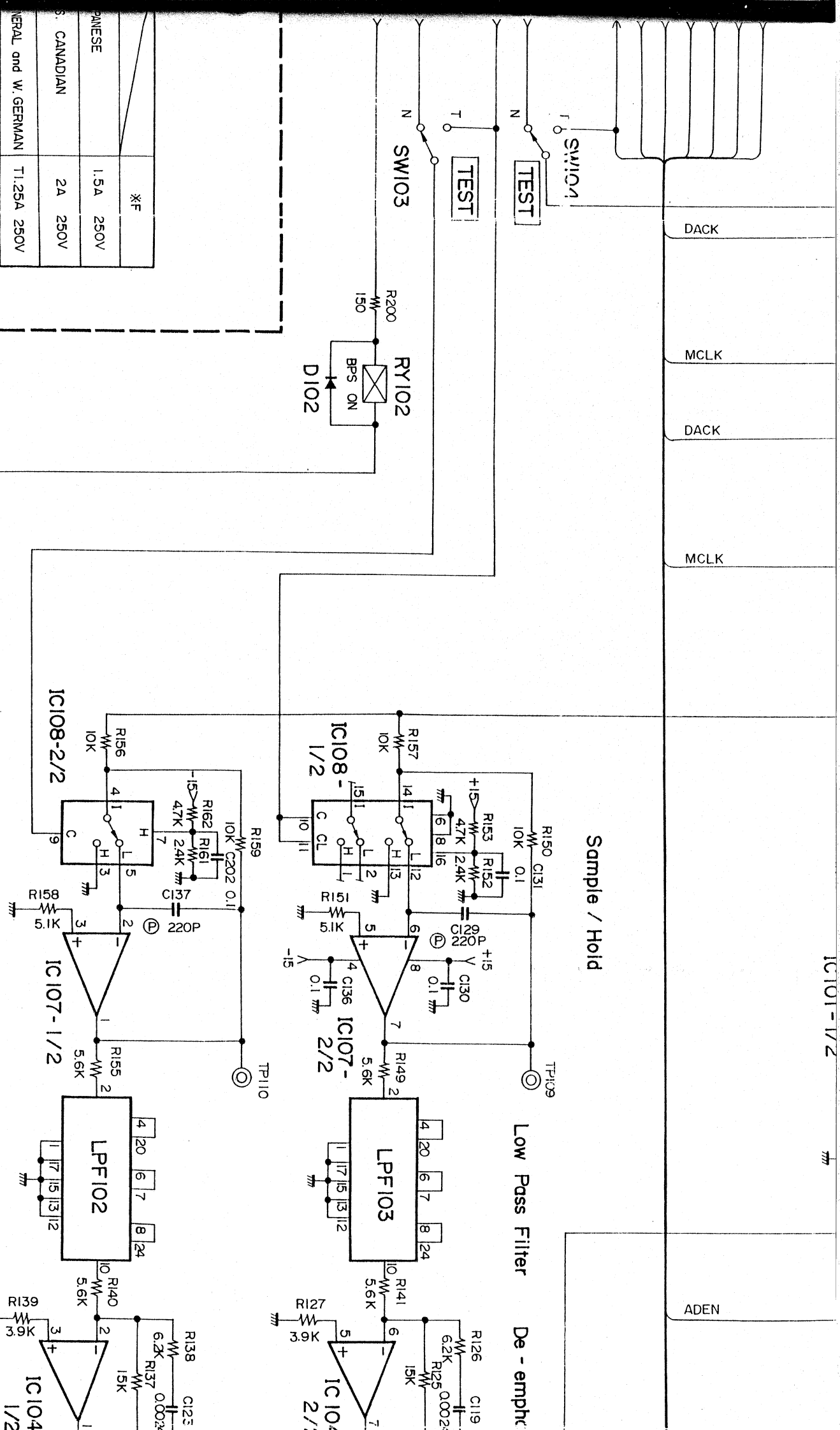


- IC101, 103, 104, 110, 111 : NJM4558DV (iG001390)
- IC102 : NJM4556D (iG042500)
- IC105, 106 : NJM7915A (iG147500)
- IC107, 113 : M5238P (XA013001)
- IC108, 112 : TC4053BP (iG055100)
- IC109 : IR9311 (iG134900)
- IC114, 115 : PCM54HP (XA566001)
- IC123, 124 : TC74H595P (iR059500)
- IC125, 126 : HD14549B (iG104500)
- IC134, 135 : TC74HC166P (iR016600)
- IC132 : TC74HC04P (iR000400)

- Q101, 103, 105 : 2SC1815 (Y)
- Q102, 104 : 2SA1015 (Y)
- Q106 : 2SC1815 (TWIN)

- D101 ~ 104, 107 ~ 118 : 1SS176
- D105, 106 : W03B
- ZD101, 102 : RD5.6EB25.6V
- RY101, 102 : DCRZ-12
- SW102 : SSP32204
- SW103, 104 : SSS214

KEC-91141-57 1/2



Sample / Hold

Low Pass Filter

De-emph

DACK

MCLK

DACK

MCLK

ADEN

IC101-1/2

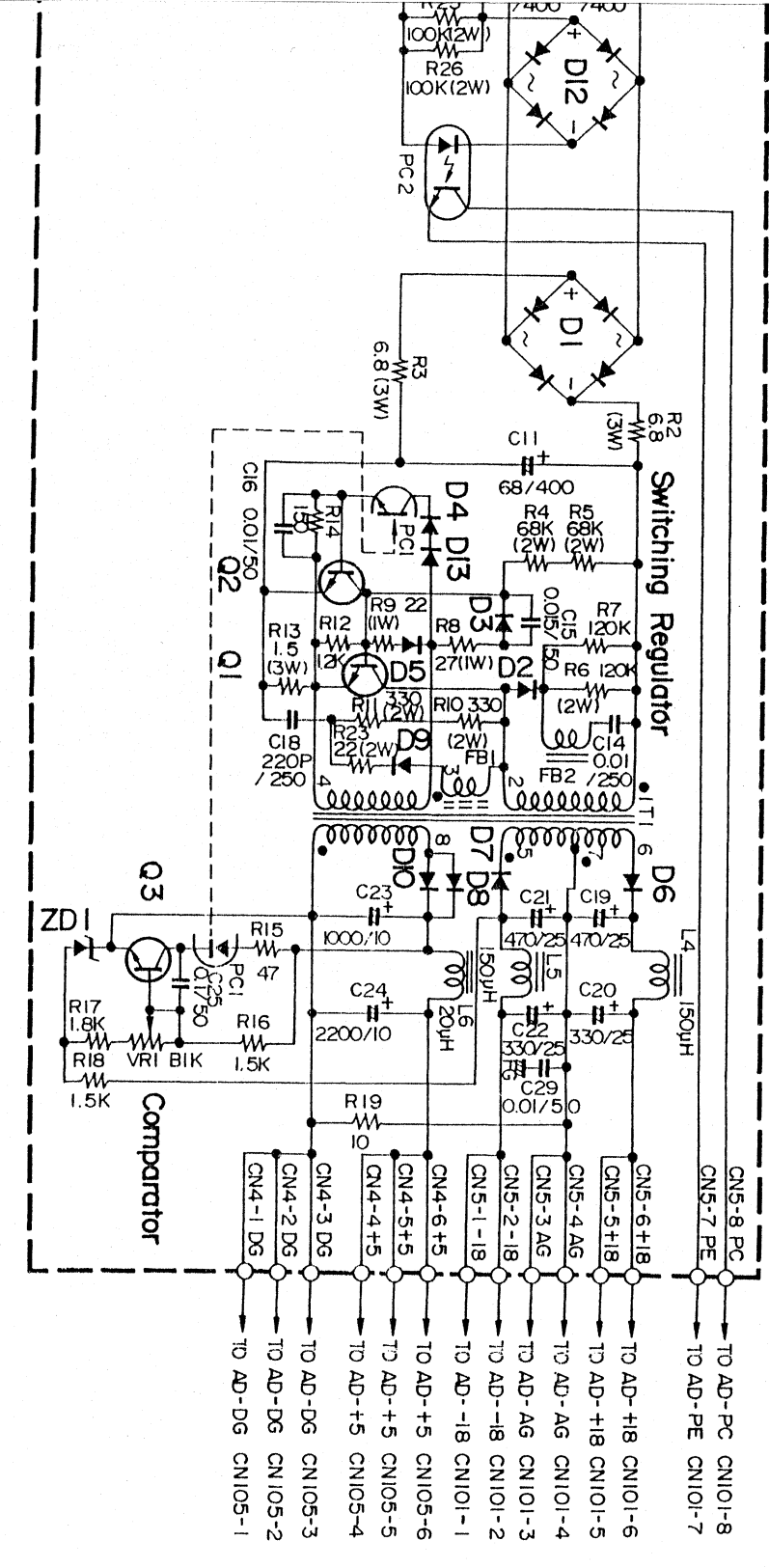
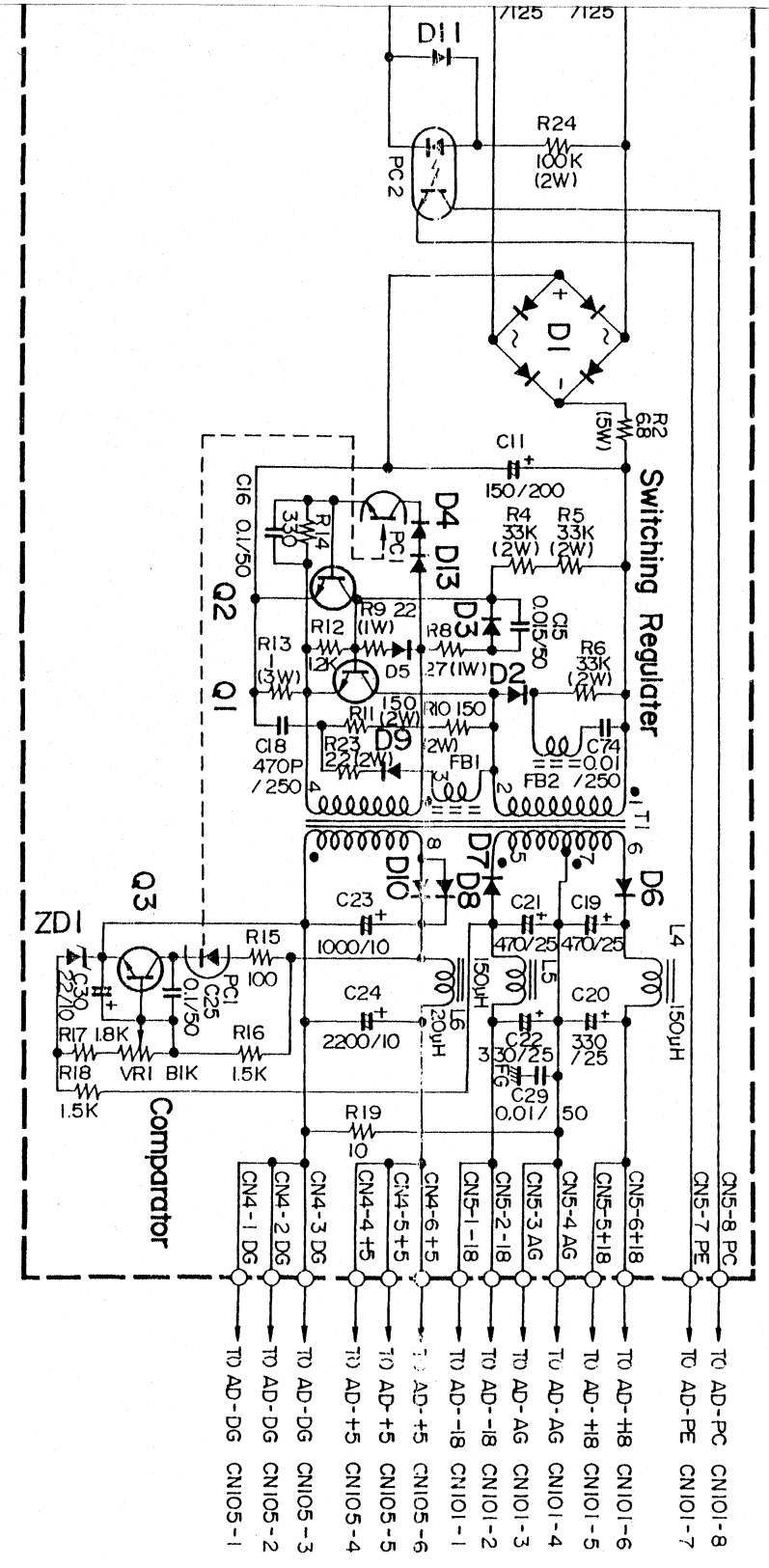
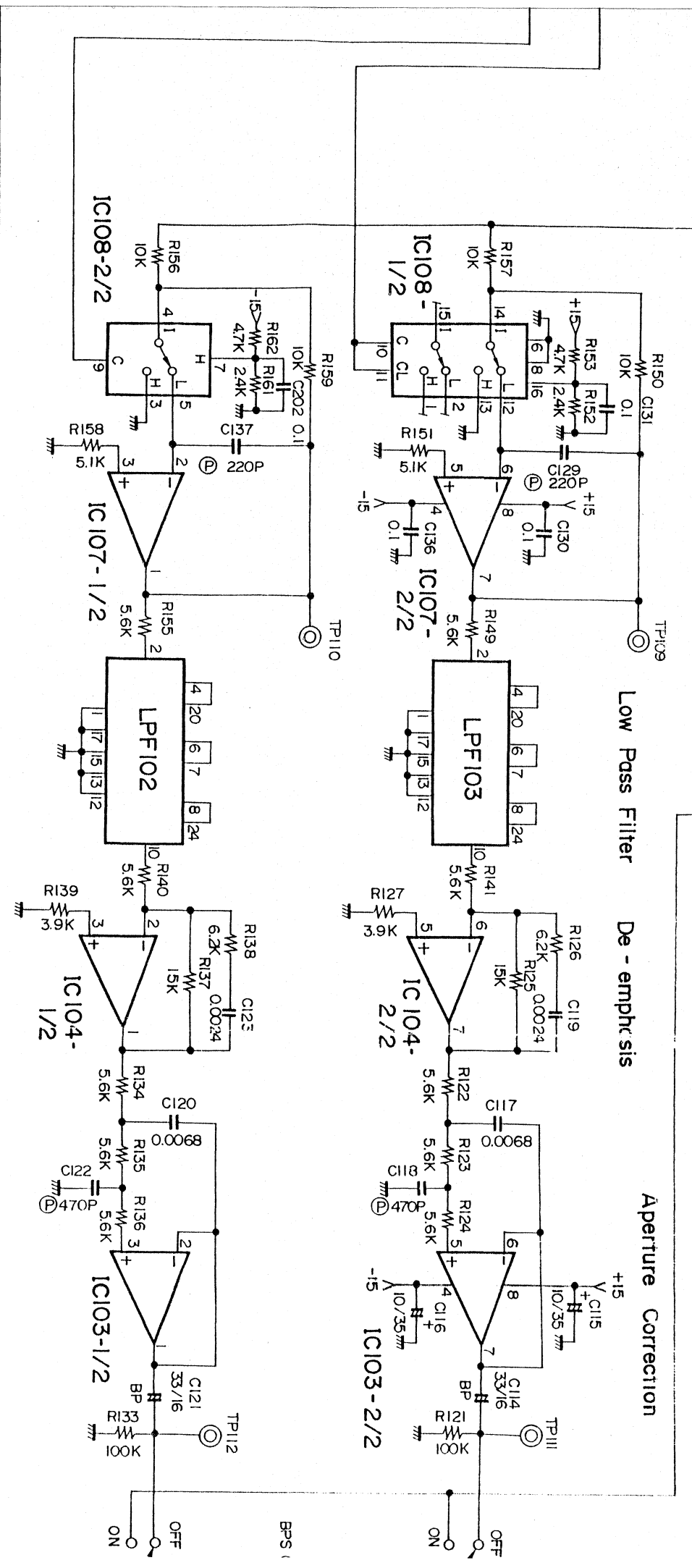
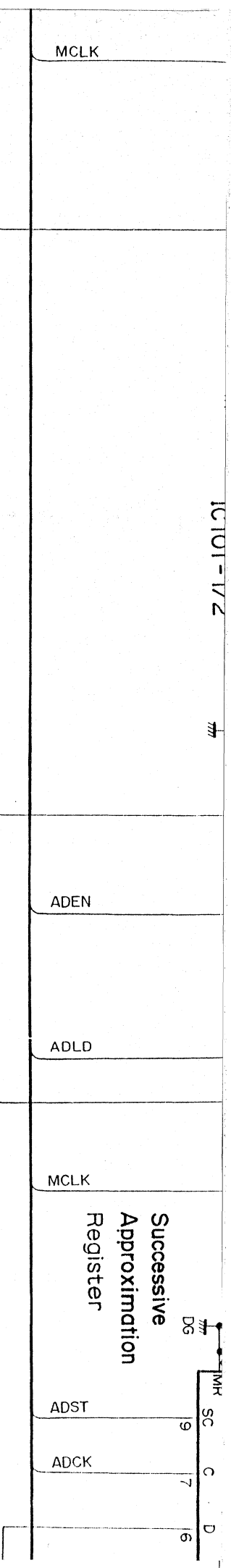
TP109

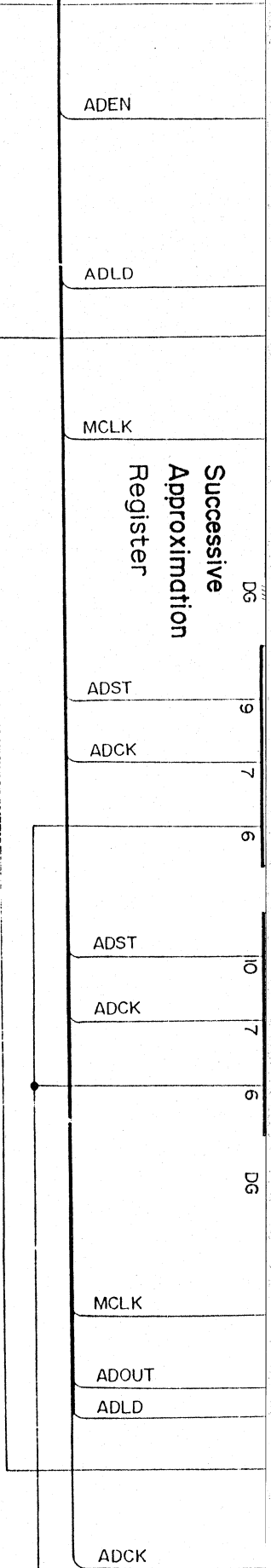
TP110

IC104

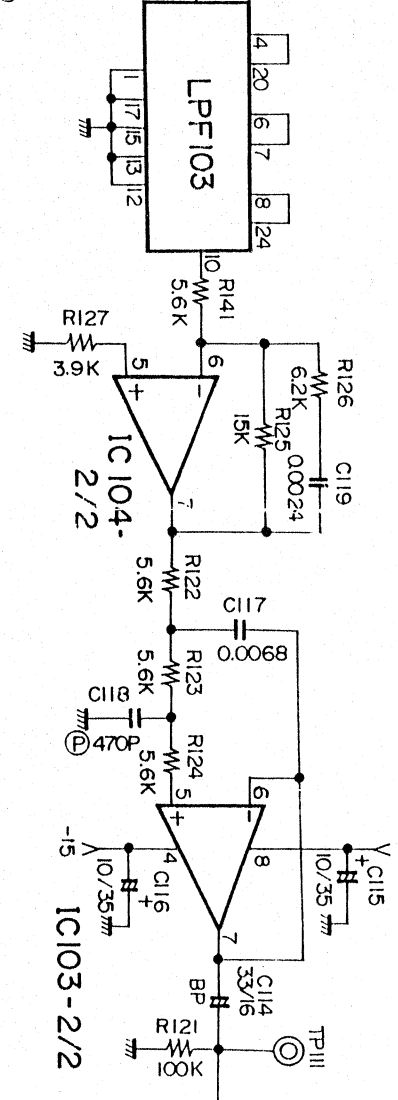
IC104

E F G H I J

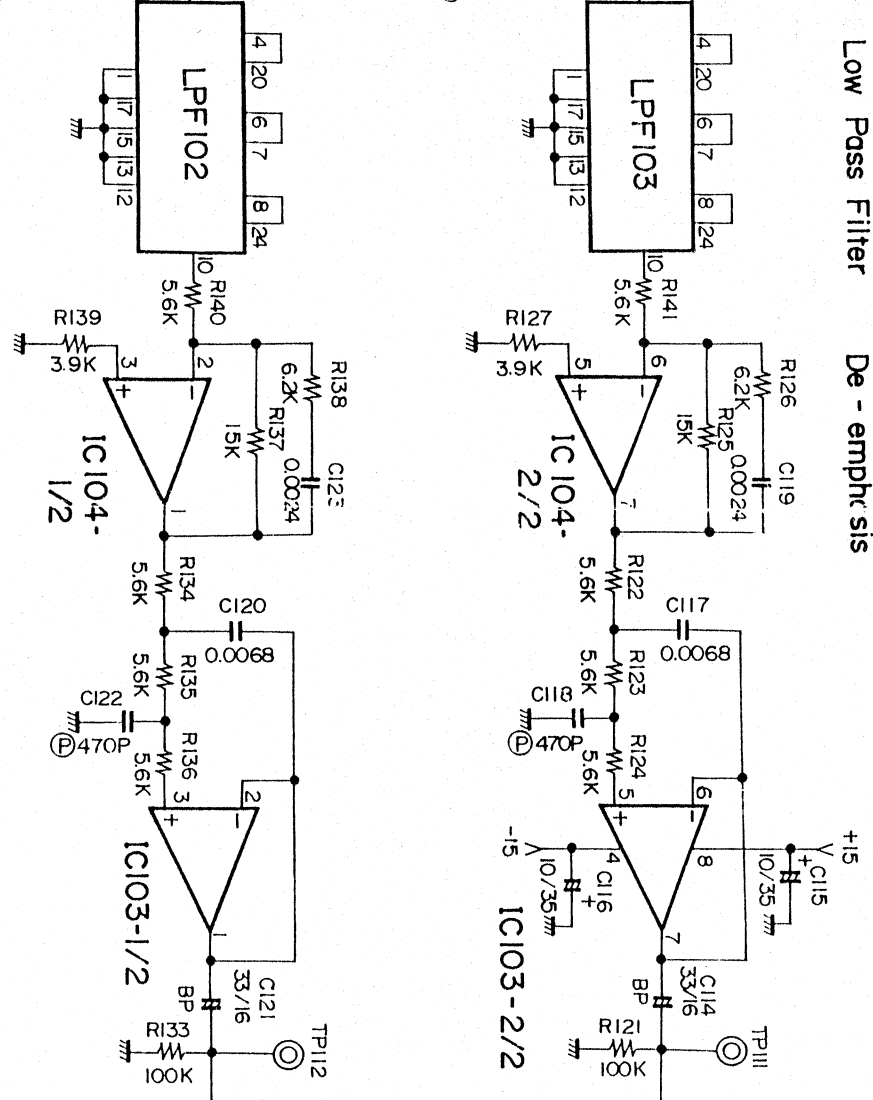




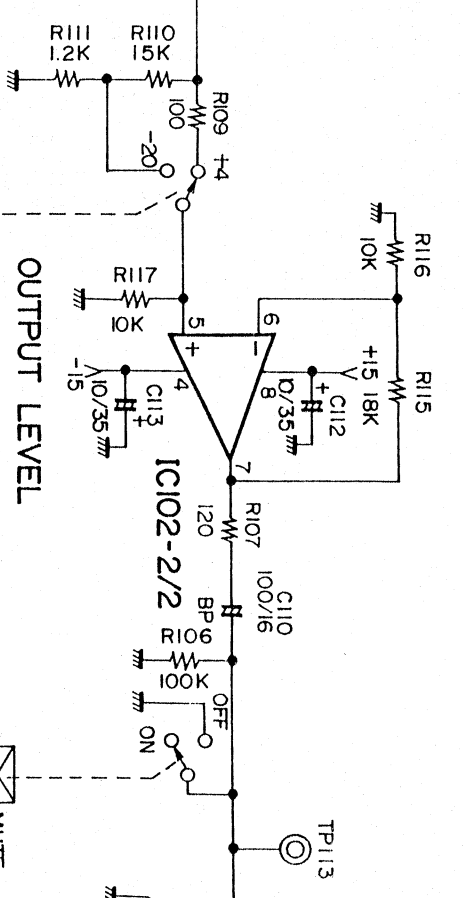
Low Pass Filter De-emphasis



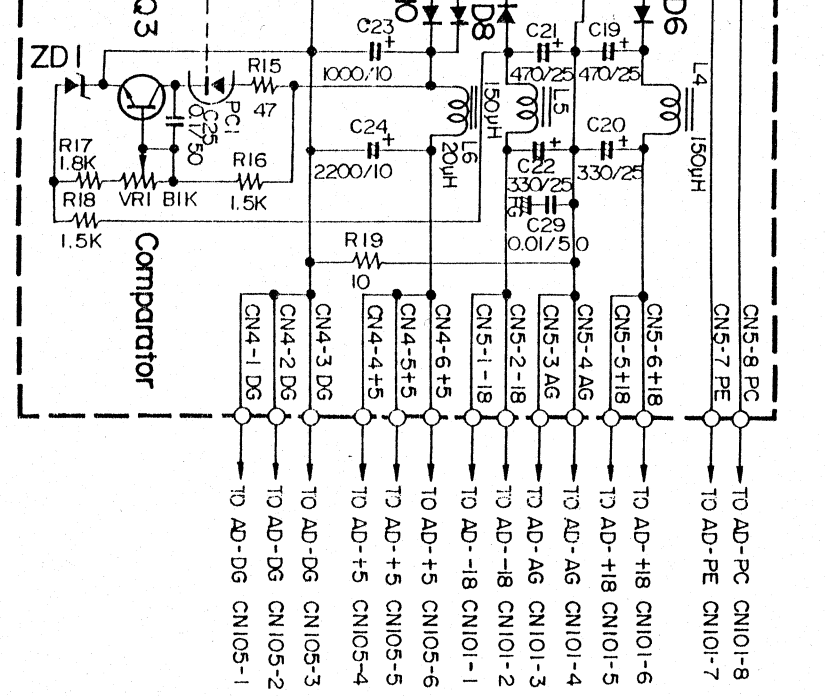
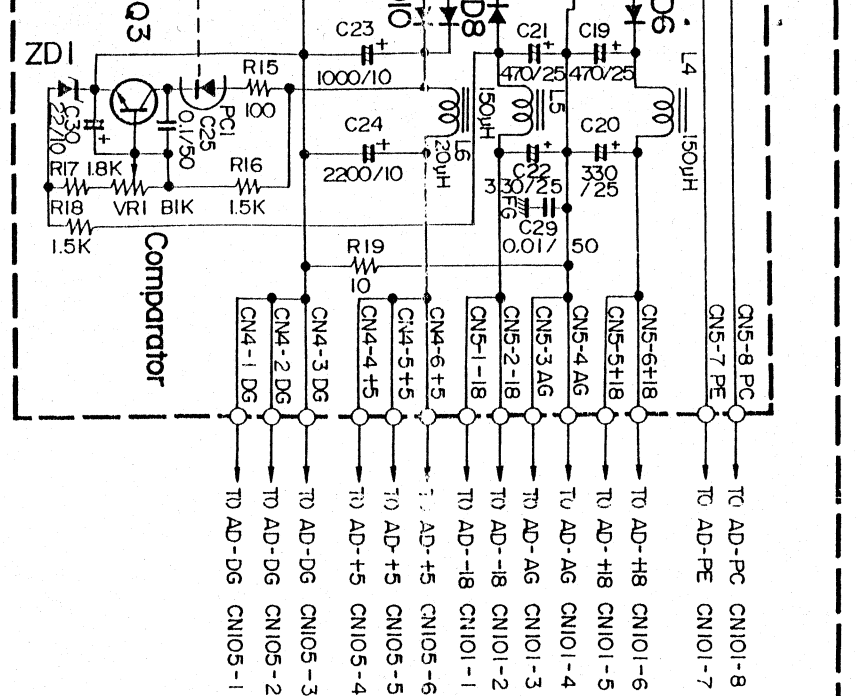
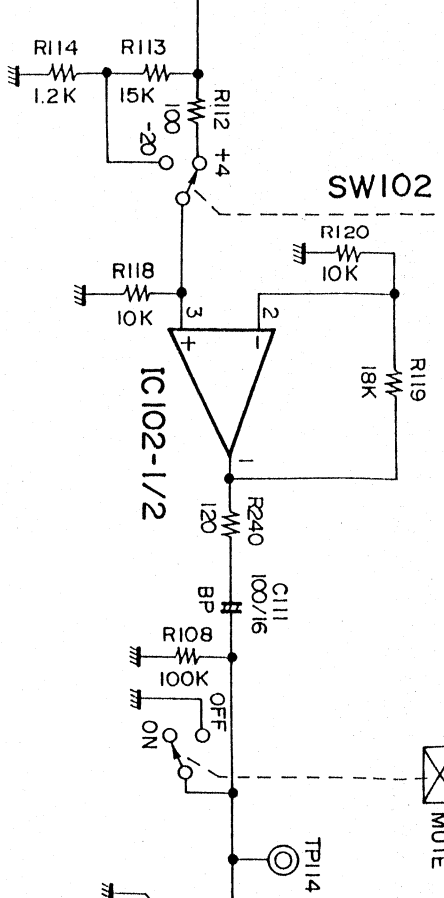
Aperture Correction



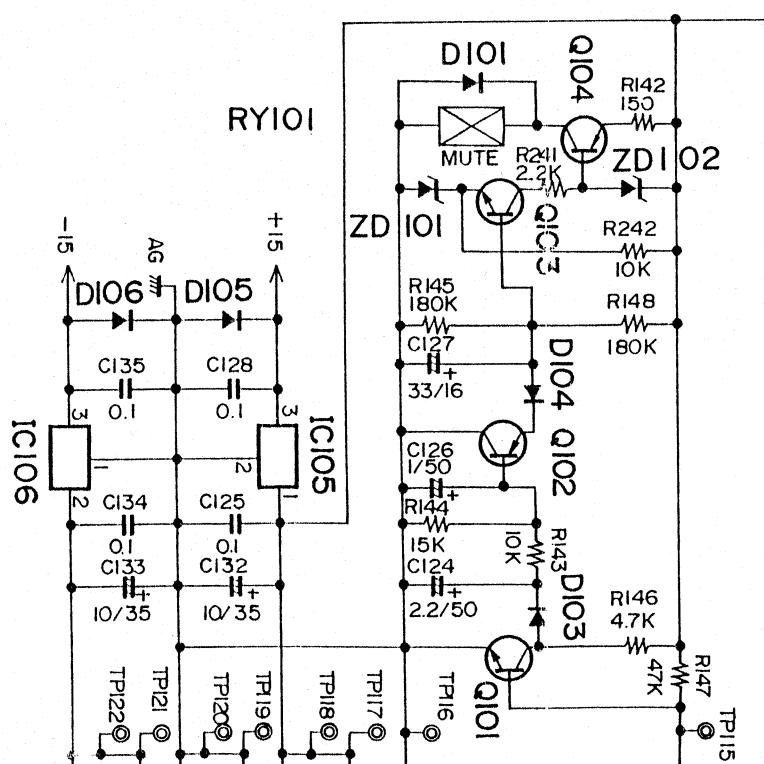
Buffer Amp



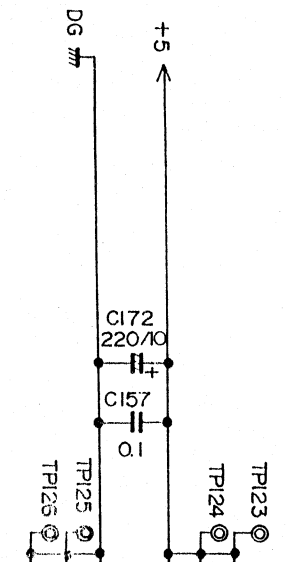
OUTPUT LEVEL



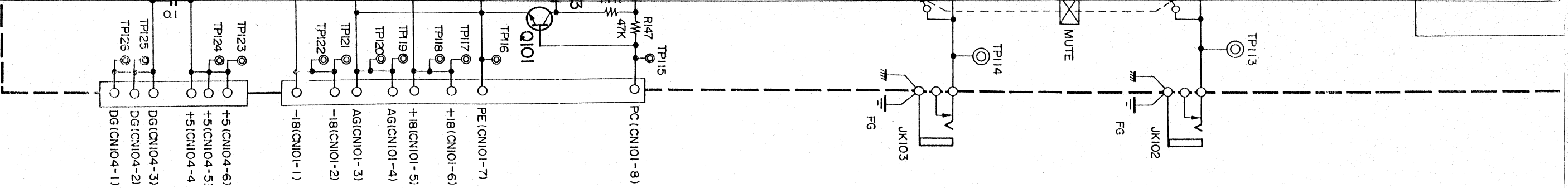
RY101



IC106



J K L M N O



L  
 R  
 OUTPUT

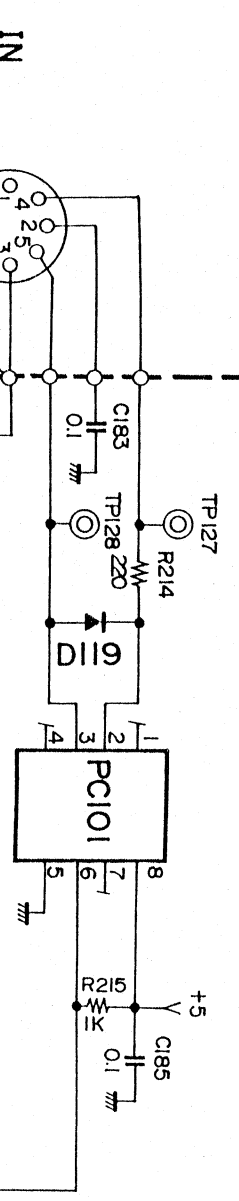
0 P 0 R S T

5 6 7 8 9 10 11 12 13 14

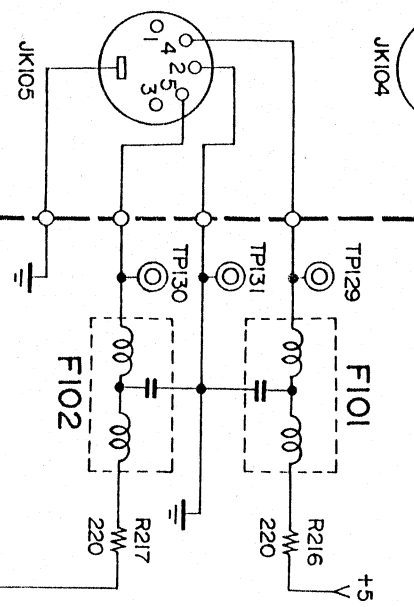
# INFO-CENTER

AD

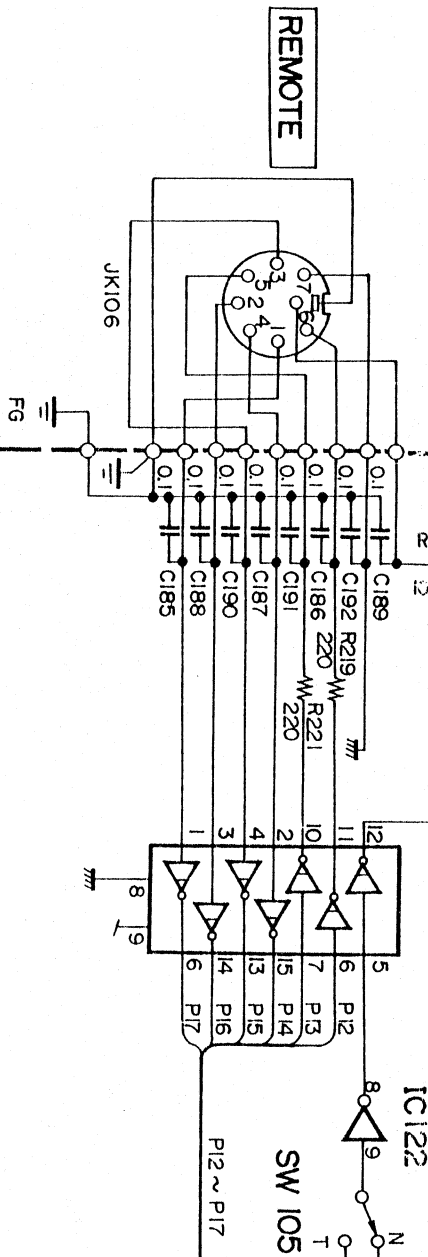
MIDI Interface



IN  
MIDI  
THRU



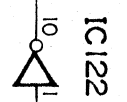
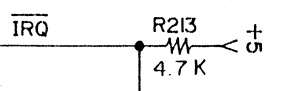
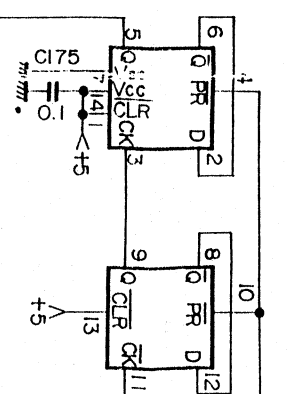
Interface  
IC143



SW 105 TEST

PIO, P11

D. Flip Flop  
IC137

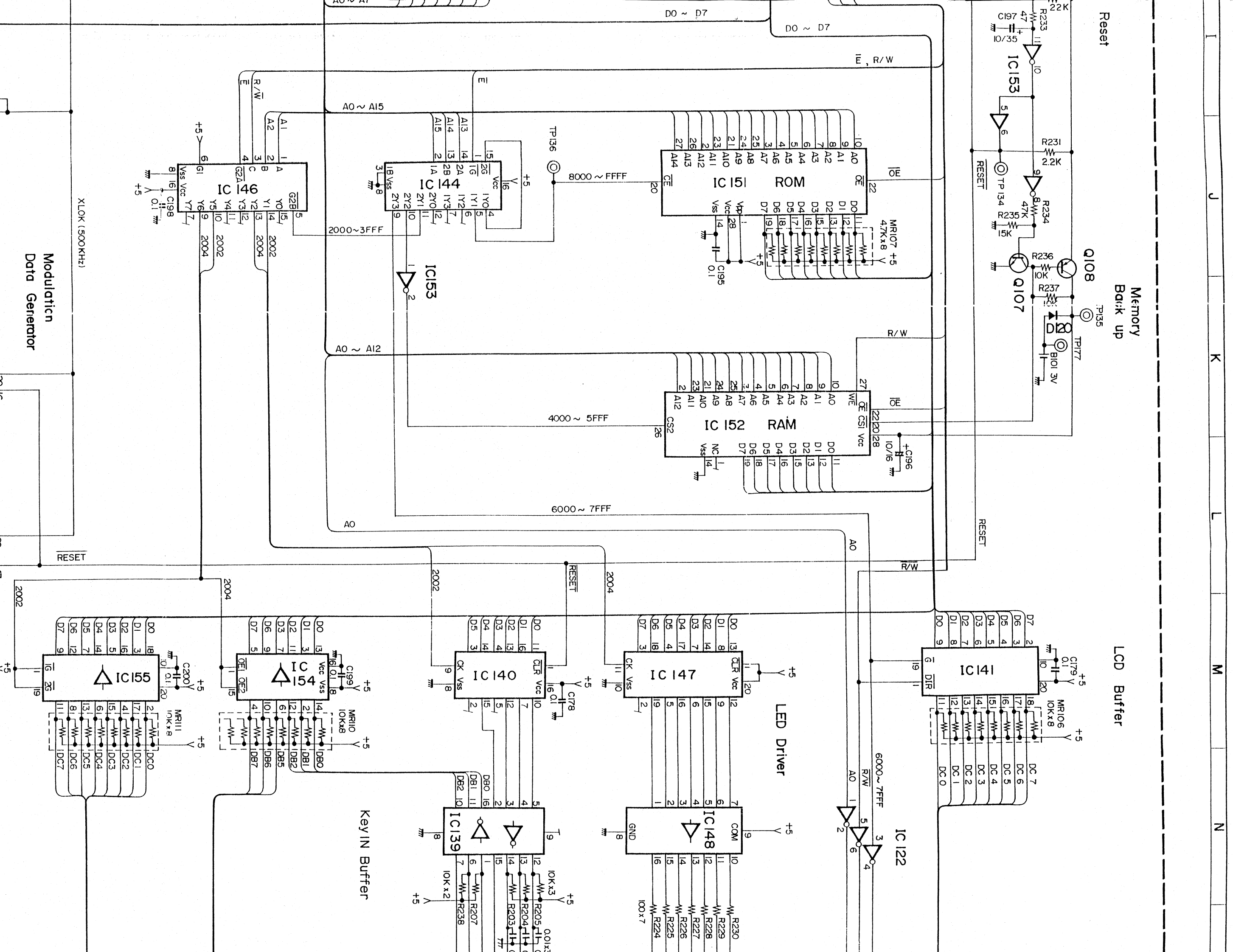


C





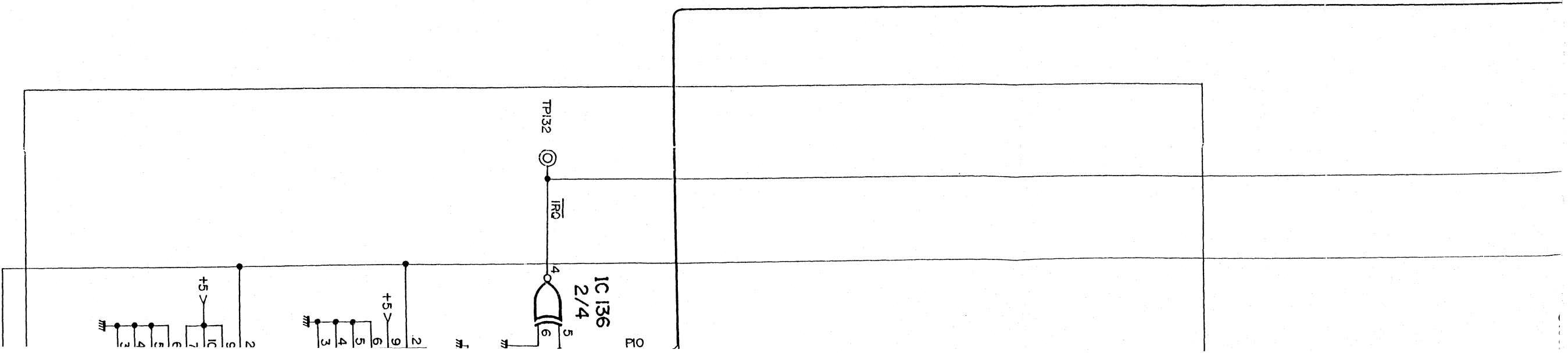
# SCHEMATIC DIAGRAM (DIGITAL SECTION)



I J K L M N

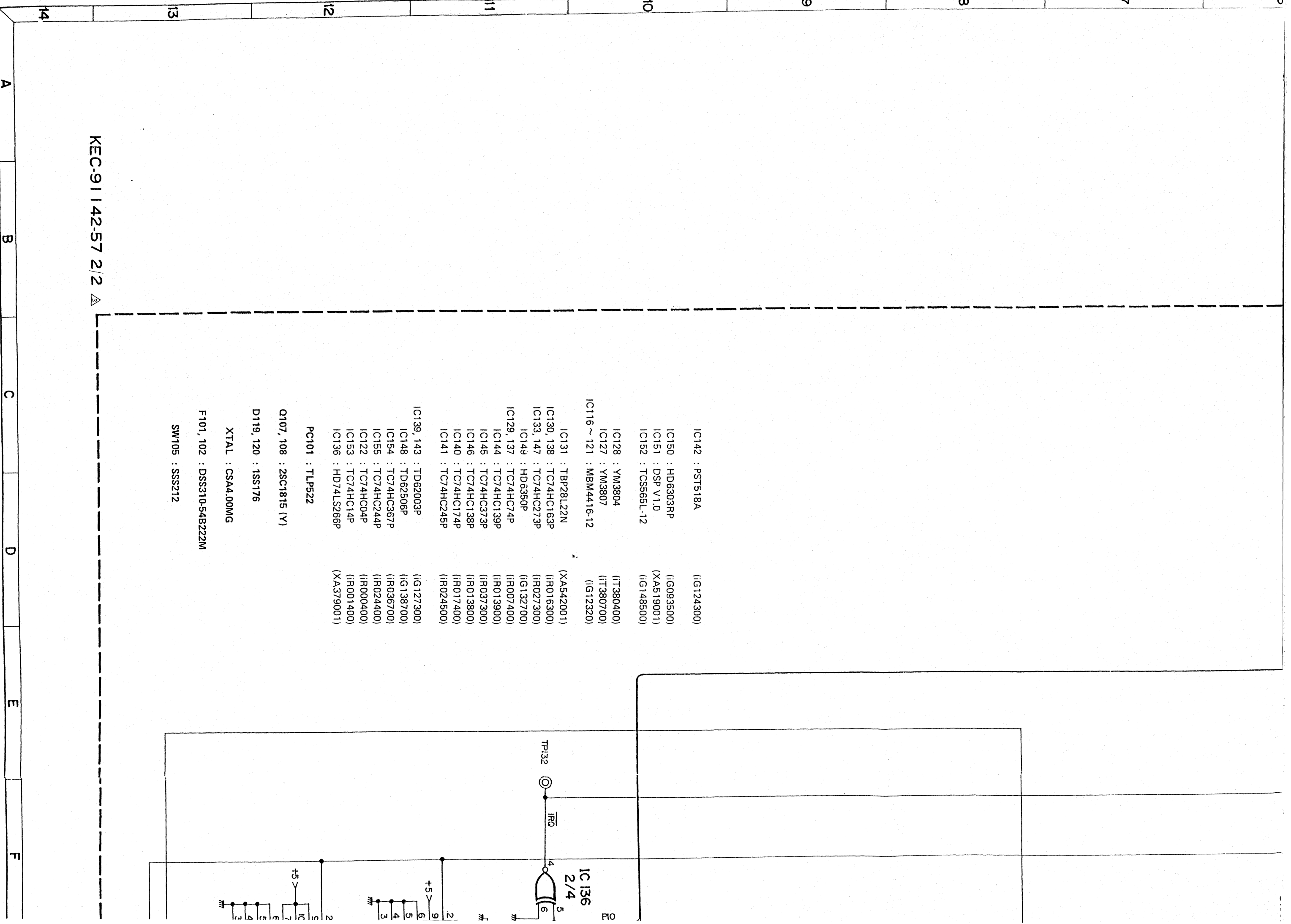




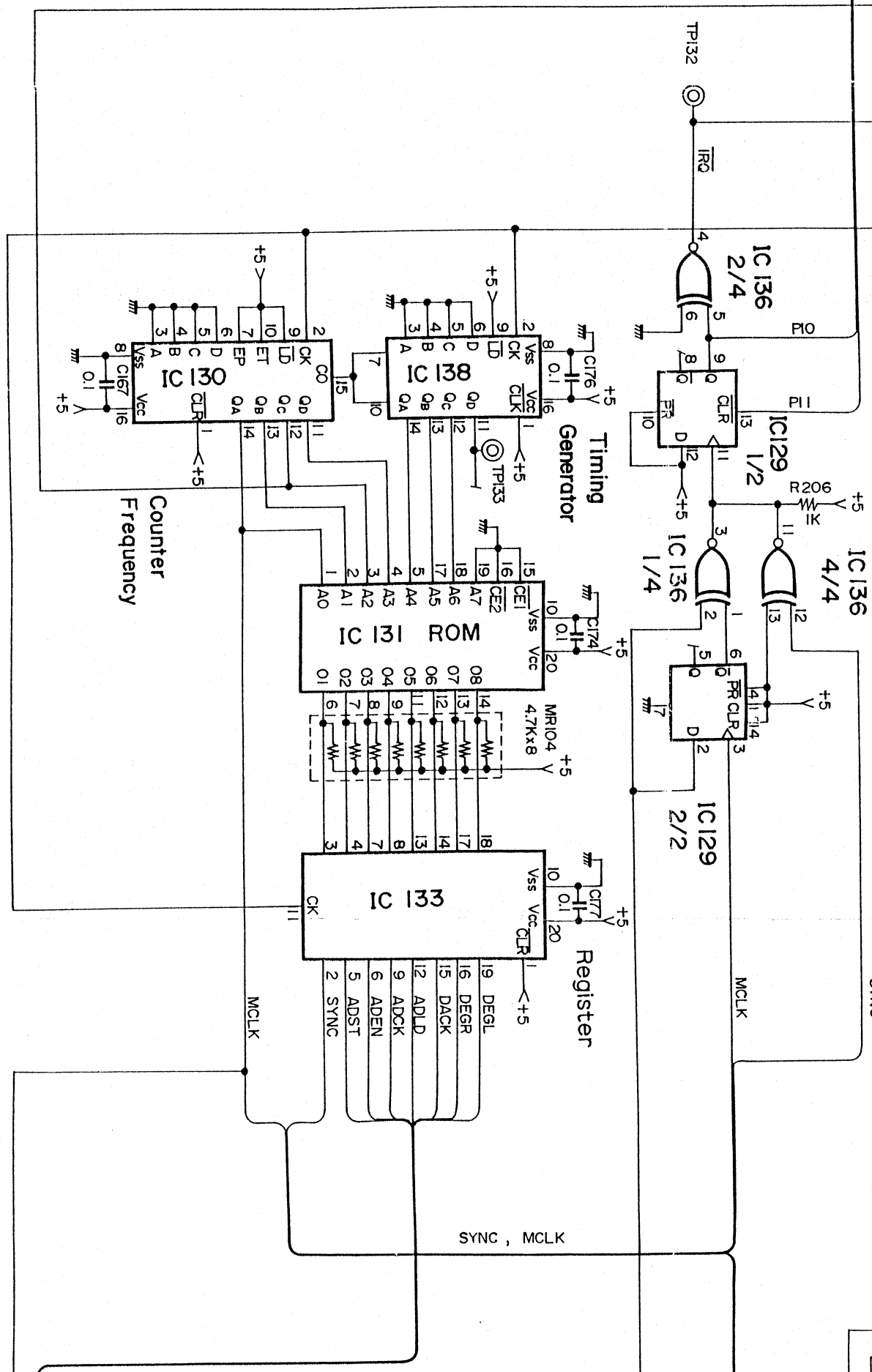
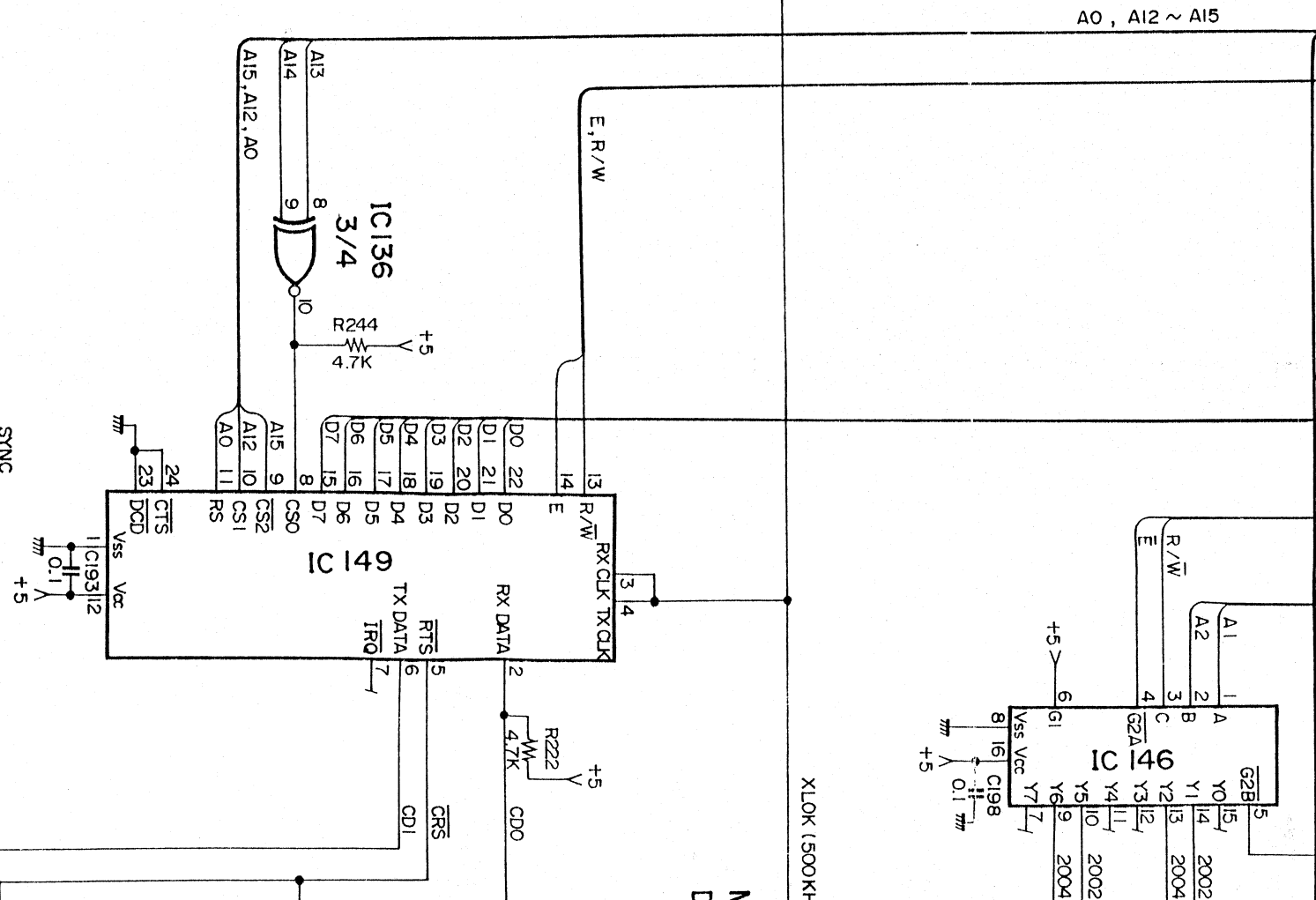
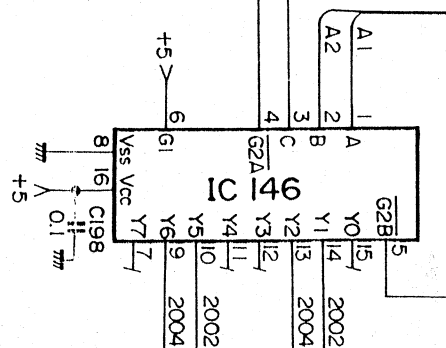


- IC142 : PST518A (IG124300)
- IC150 : HD6303RP (IG093500)
- IC151 : DSP V1.0 (XA519001)
- IC152 : TCSS65L-12 (IG148500)
- IC128 : YM3804 (IT380400)
- IC127 : YM3807 (IT380700)
- IC116 ~ 121 : MBM4416-12 (IG12320)
- IC131 : TBP28L22N (XA542001)
- IC130, 138 : TC74HC163P (IR016300)
- IC133, 147 : TC74HC273P (IR027300)
- IC149 : HD6350P (IG132700)
- IC129, 137 : TC74HC74P (IR007400)
- IC144 : TC74HC139P (IR013900)
- IC145 : TC74HC373P (IR037300)
- IC146 : TC74HC138P (IR013800)
- IC140 : TC74HC174P (IR017400)
- IC141 : TC74HC245P (IR024500)
- IC139, 143 : TD62003P (IG127300)
- IC148 : TD62506P (IG138700)
- IC154 : TC74HC367P (IR036700)
- IC155 : TC74HC244P (IR024400)
- IC122 : TC74HC04P (IR000400)
- IC153 : TC74HC14P (IR001400)
- IC136 : HD74LS266P (XA379001)
- PC101 : TLP522
- Q107, 108 : 2SC1815 (Y)
- D119, 120 : 1SS176
- XTAL : CSA4.00MG
- F101, 102 : DSS310-54B222M
- SW105 : SSS212

KEC-91142-57 2/2

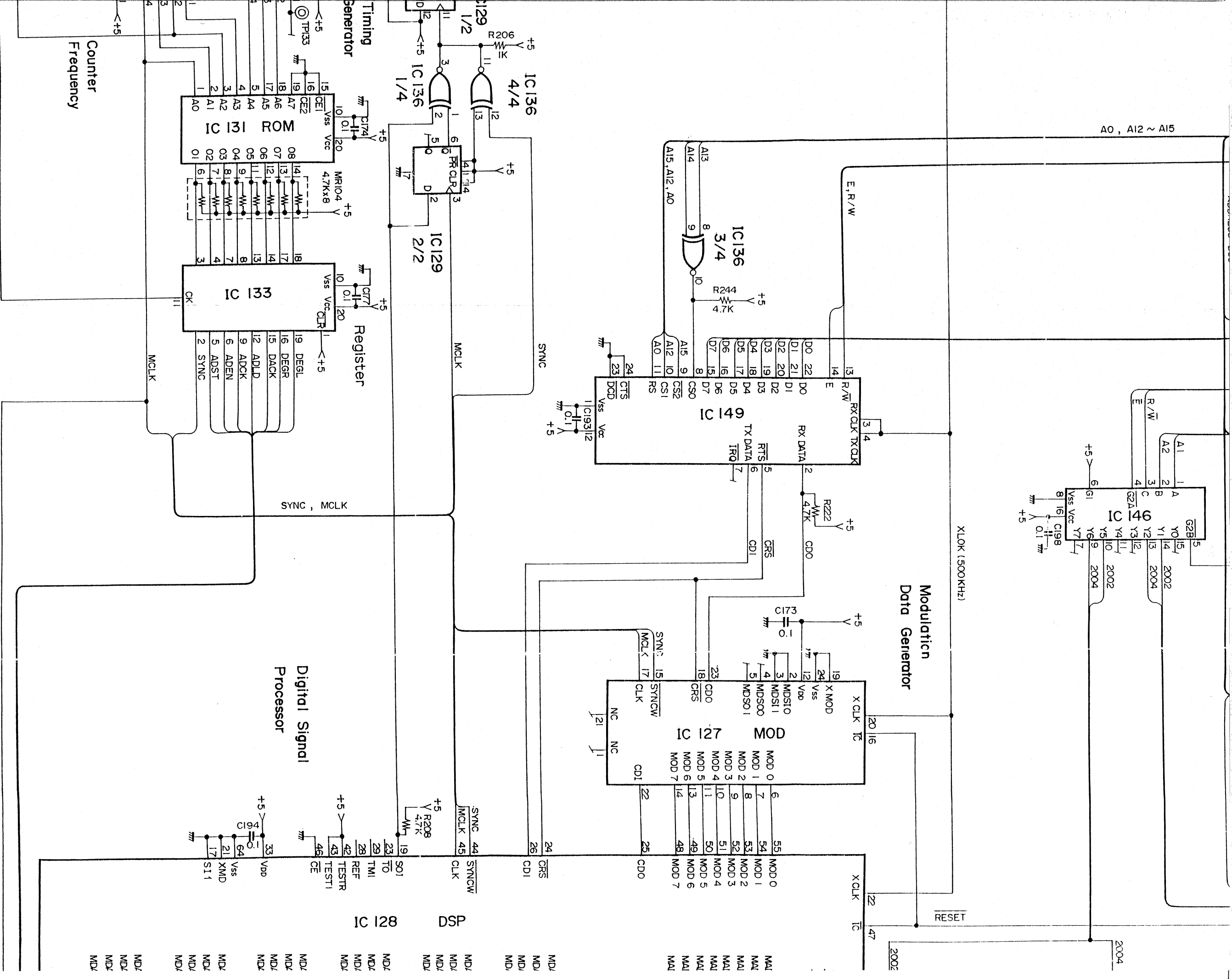


10



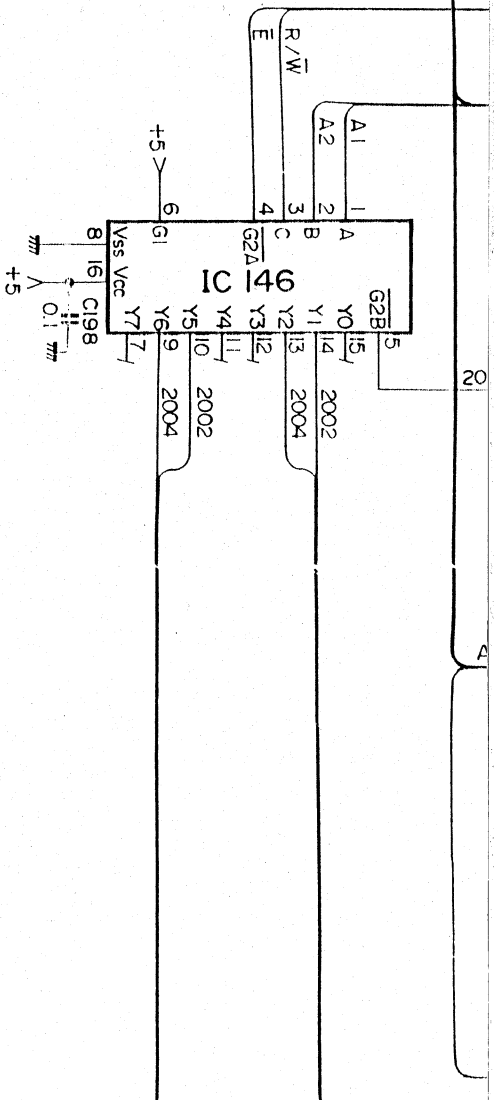
- (G124300)
- (G093500)
- KA519001)
- (G148500)
- (T380400)
- (T380700)
- (G12320)
- KA542001)
- (R016300)
- (R027300)
- (G132700)
- (R007400)
- (R013900)
- (R037300)
- (R013800)
- (R017400)
- (R024500)
- (G127300)
- (G138700)
- (R036700)
- (R024400)
- (R000400)
- (R001400)
- KA379001)

XLOK 1500KHz

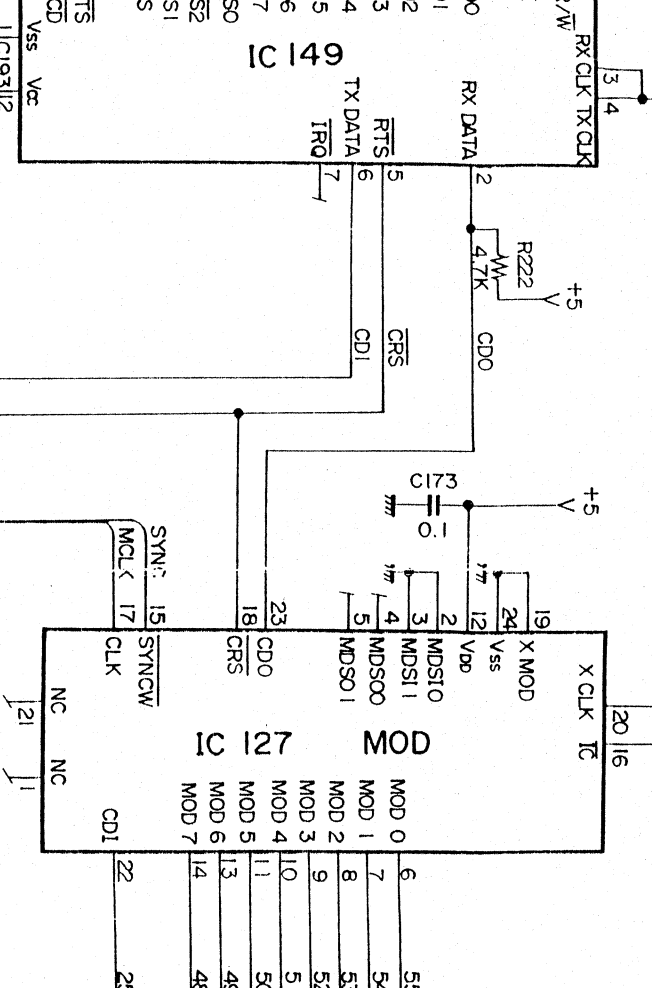


G H I J K L

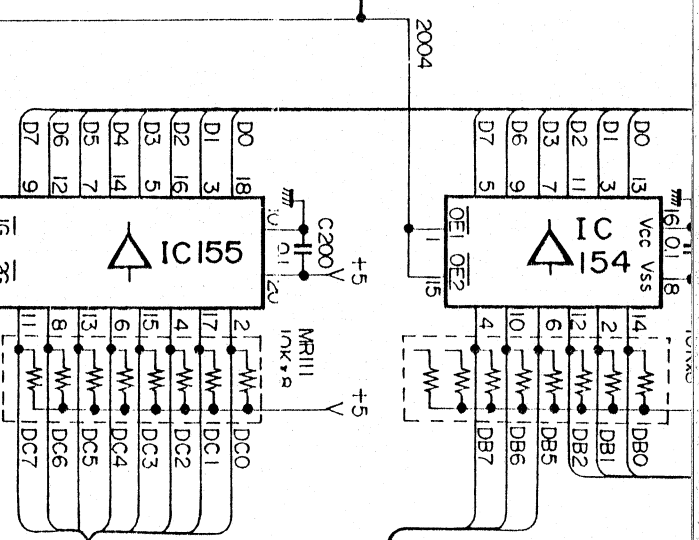
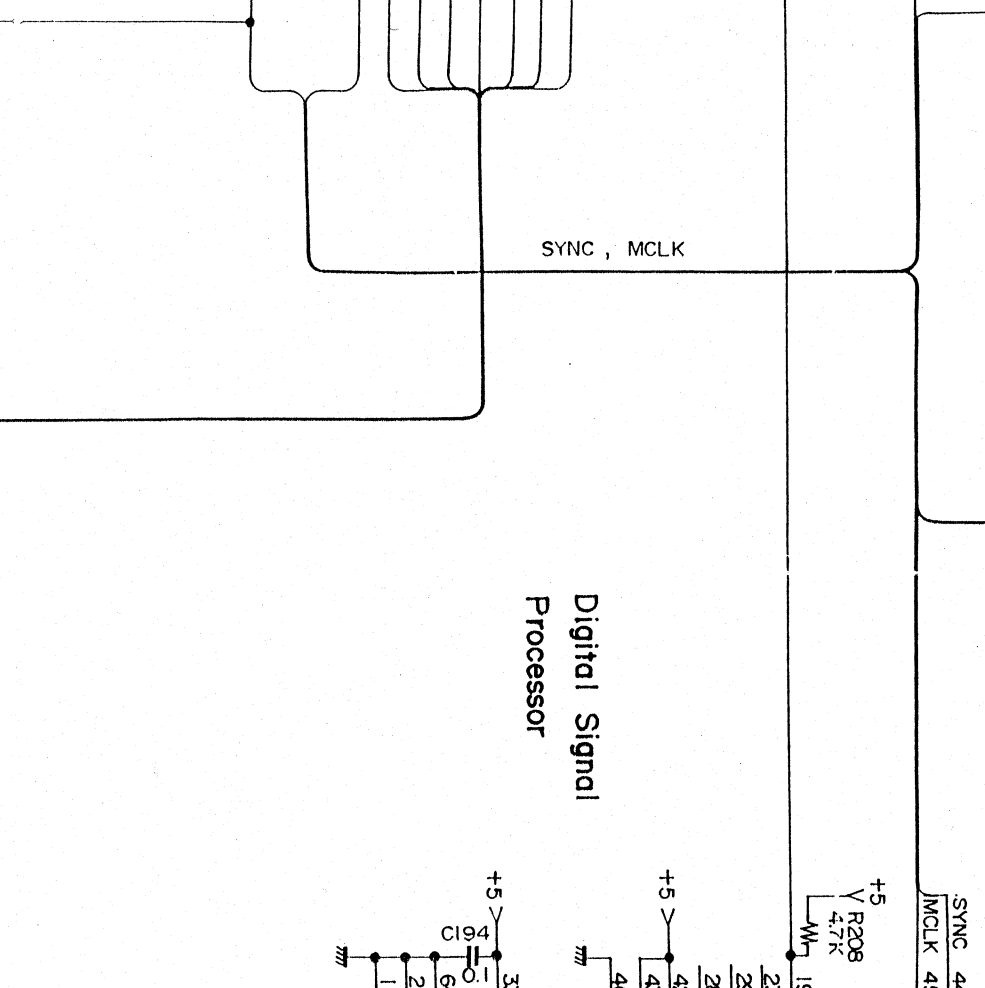
11



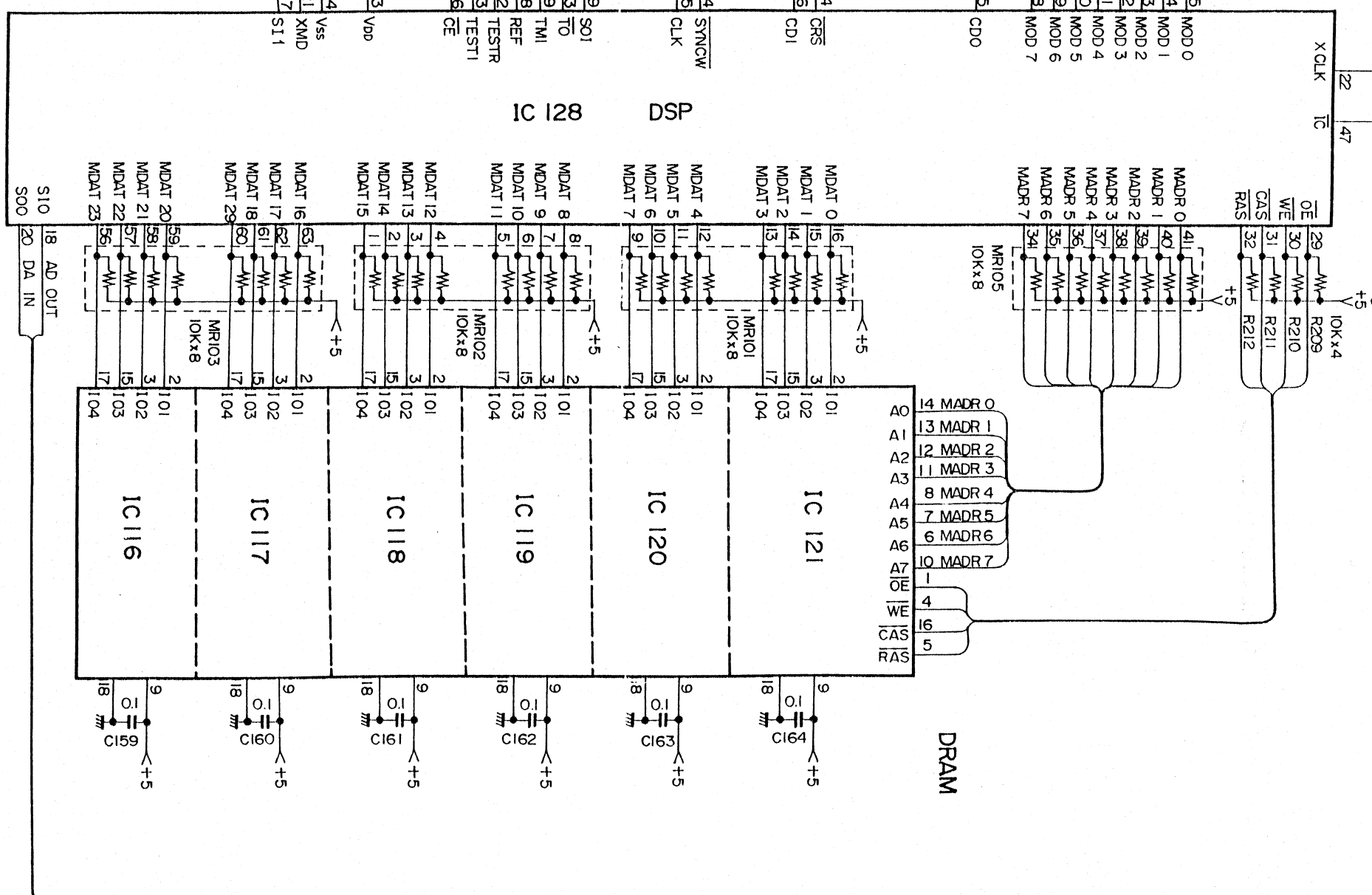
**Modulation Data Generator**



**Digital Signal Processor**

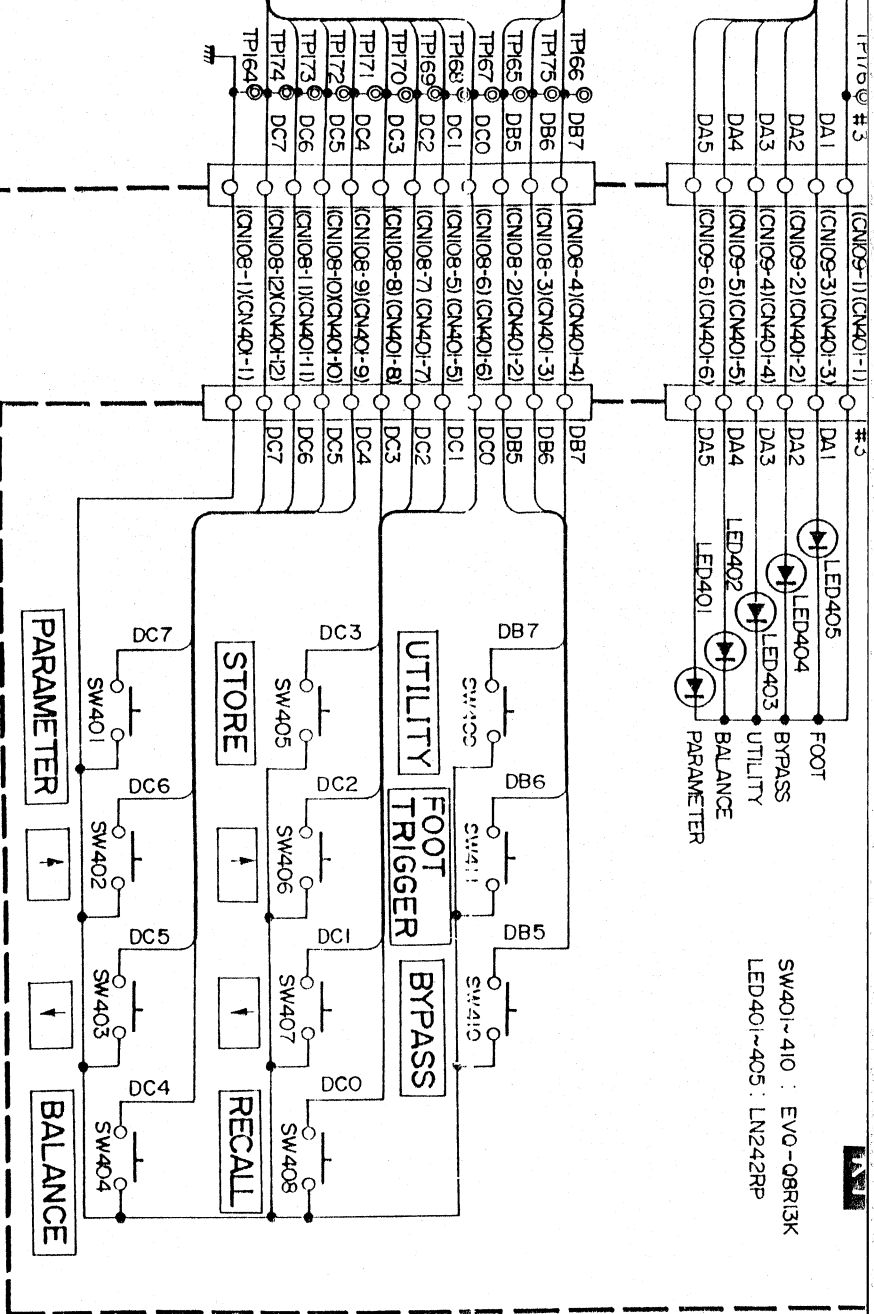
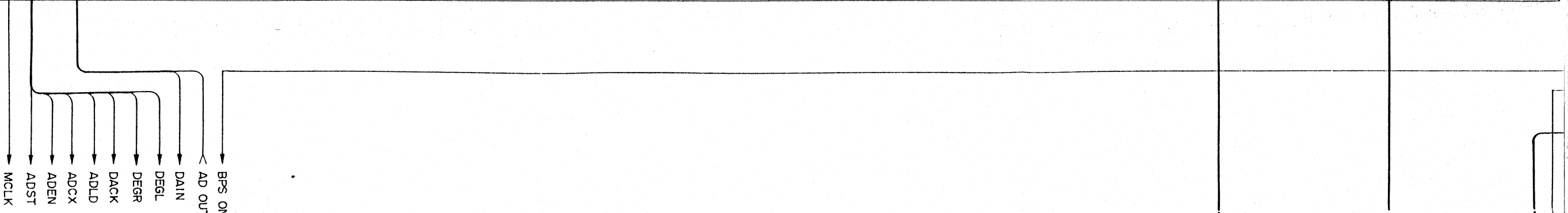


**DRAM**



J K L M N O

11



0 P Q R S T

14 13 12 11 10 9 8 7

Ref	Part No	Description	部品名	Remarks	ランク
* 1	VA736800	Rear Panel	リアパネル	J	
* 1	VA739200	Rear Panel	リアパネル	UC	
* 1	VA739300	Rear Panel	リアパネル	HDA	
2	MG001820	Power Cord	電源コード	J	05
2	MG000270	Power Cord	電源コード	UC	09
2	MG000450	Power Cord	電源コード	HD	08
2	MG001300	Power Cord	電源コード	A	07
3	CB806850	Cord Strain Relief	コードストッパー	UC	02
3	CB032840	Cord Strain Relief	コードストッパー	HDA	01
* 4	VA813800	Power Supply Unit	電源ユニット	J	
* 4	VA813900	Power Supply Unit	電源ユニット	U	
* 4	VA814000	Power Supply Unit	電源ユニット	C	
* 4	VA814100	Power Supply Unit	電源ユニット	HDA	
* 5	VA738100	Rod	ロッド		
6	CB812380	Push Button	プッシュボタン		01
* 7	VA738200	Stay	ステイ		
* 8	VA849000	AD Circuit Board	ADシート		
* 9	VA757800	Holder, Sheet	シートホルダー		
10	VA849100	KY Circuit Board	KYシート		
11	VA883800	LCD Assembly	LCD Ass'y		
12	AA805820	Spacer	スペーサ		
13	VA061700	Cover, LED	LED カバー		02
* 14	VA302700	Cover, LED	LED カバー		01
* 15	VA849200	FP Circuit Board	FPシート		
* 16	VA738400	Front Panel	フロントパネル		
* 17	VA738600	Meter Cover	メーターカバー		
* 18	VA029600	Switch Escutcheon (L)	スイッチエスカッション (L)	Single	01
* 19	VA314300	Switch Escutcheon	スイッチエスカッション	Double	01
* 20	VA314400	Switch Escutcheon	スイッチエスカッション		01
* 21	VA029300	Knob	つまみ		
* 22	VA909000	Key Top	キートップ	PARAMETER	
* 22	VA908700	Key Top	キートップ	↑	
* 22	VA908800	Key Top	キートップ	↓	
* 22	VA909300	Key Top	キートップ	BALANCE	
* 22	VA993300	Key Top	キートップ	STORE	
* 22	VA993400	Key Top	キートップ	RECALL	
* 22	VA909500	Key Top	キートップ	UTILITY	
* 22	VA993200	Key Top	キートップ	BYPASS	
* 22	VA910900	Key Top	キートップ	FOOT TRIGGER	
* 23	VA885300	LCD Display	液晶ディスプレイ		17
* 24	VA902500	LED Display	LED ディスプレイ		06
* 25	VA737800	Bottom Cover	ボトムカバー		
* 26	VA908100	Isolation Sheet	絶縁シート		
27	CB834210	Foot	ゴム脚		02
* 28	VA737900	Top Cover	トップカバー		
29	PC900040	Lithium Battery, 3V	リチウム電池		04
30	LA003690	Lug Terminal	ラグ端子	UCHDA	01
31	EV413076	Toothed Lock Washer	歯付座金	PACK	
32	EX200180	Hexagonal Nut	特殊六角ナット		01
33	LX200060	Hexagonal Nut	特殊六角ナット		01
34	LX200010	Plain Washer	特殊平座金		01
35	EV410096	Toothed Lock Washer	歯付座金	PACK	01
36	EV413036	Toothed Lock Washer	歯付座金	PACK	01
37	EA326056	Pan Head Screw	ナット小ネジ	PACK	01
38	EI330086	Bind Head Tapping Screw	ハインドタッピングネジ	PACK	01
39	EI340066	Bind Head Tapping Screw	ハインドタッピングネジ	PACK	01
* 40	VA880800	Flat Cable	束線		

\* : New Parts (新規部品) NR

ランク : Japan Only

SPX90